A CHILTON PUBLICATION

The Iron Age

E NATIONAL METALWORKING WEEKLY October 4, 1951

UNIV. OF MICHIGAN

ENTS PAGE 2

OCT 5 1951
EAST ENGINEERING
LIBRARY

THE MEDART COMPANY mounts straightener rolls, drives and couplings on Timken bearings to assure precision and long life with a minimum of maintenance. One of the largest ever built, this straightener uses 64 Timken bearings.

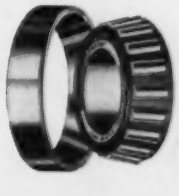
Precision's a pipe for pipe straightener on TIMKEN® bearings

THIS MEDART #10 Multicycle Rotary Straightener is one of the largest ever built. It will straighten up to 16" O. D. pipe with less stress —and at high speed! To assure precision straightening and long, trouble-free life, the rolls, drives and couplings are mounted on a total of 64 Timken® bearings.

Timken tapered roller bearings take radial and thrust loads in any combination due to their tapered design. Shafts are held in positive alignment, gears mesh accurately. Line contact between the rollers and races gives Timken bearings extra load-carrying capacity. And Timken bearings permit closures that retain lubricants longer, keep dirt and moisture out.

Timken bearings are first choice throughout industry. Look for the trade-mark "Timken" on the bearings you use. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

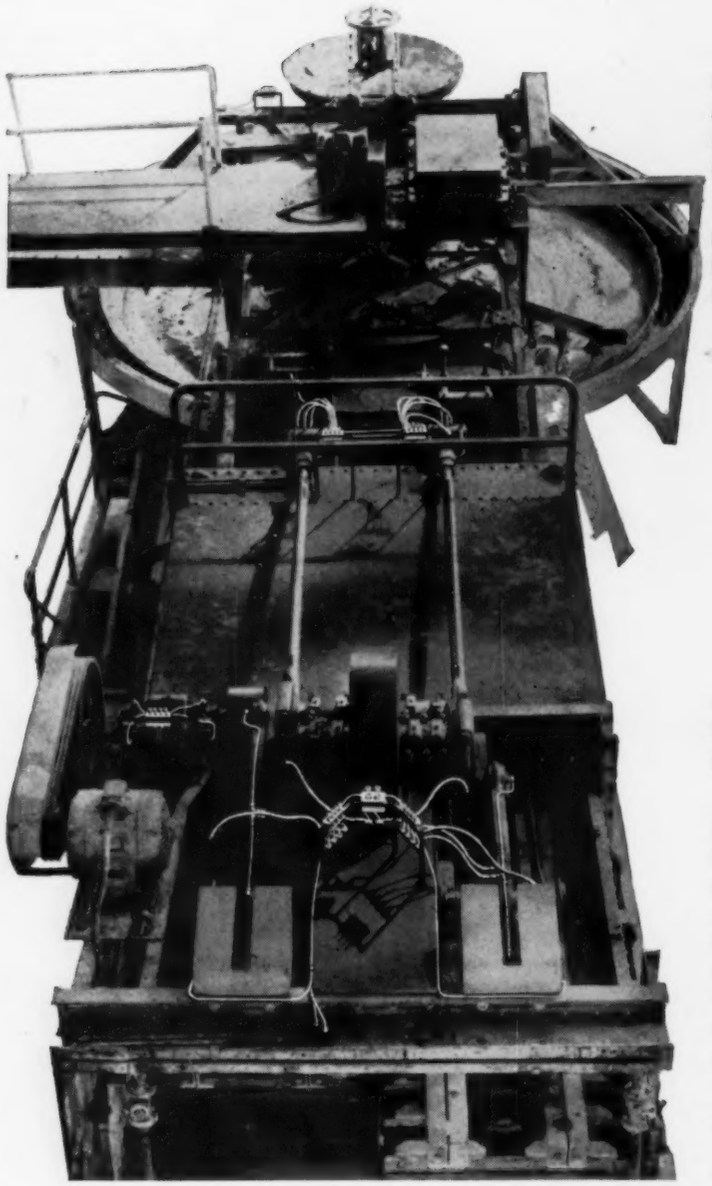


NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◐ AND THRUST —◐— LOADS OR ANY COMBINATION —✳—

FARVAL—*Studies in Centralized Lubrication* No. 124

IN SOUTH AFRICA

Farval speeds gold production, saving lubricants, labor and bearing expense



Farval installation on a Dorr Bowl Classifier at the Venterspost Gold Mining Co., Ltd., Witwatersrand, Transvaal. Note the unusual method of mounting the 4 groups of valve blocks on special frames above the machinery.

● Pressed for more production, equipment at South African gold mines is operated around the clock. Any shutdown, as for lubrication or bearing repair, interferes seriously with gold output.

This need for uninterrupted operation led to a trial installation of Farval Centralized Lubrication by one company on a Dorr Classifier. Benefits were obvious immediately:

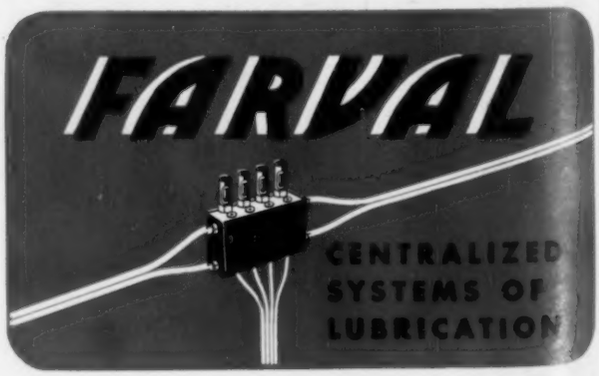
1. It is no longer necessary to shut down equipment to lubricate it.
2. Certain difficulties in gold extraction, formerly caused by presence of surplus grease are eliminated.
3. Dust containing cyanide is kept out of the bearings, thus reducing wear and saving repairs.
4. Lubricating labor is saved.
5. Waste is eliminated, with a consequent saving in grease of approximately 80%. This saving alone pays for the installation of Farval.

Results have been so amazing that, one after another, gold mining companies have tried out Farval Centralized Lubrication and then installed systems widely throughout their plants.

Farval is the original Dualine system of centralized lubrication, proved practical in 20 years of service. The Farval valve has only two moving parts—is simple, sure and foolproof, without springs, ball-checks or pinhole ports to cause trouble. Through its full hydraulic operation, Farval unfailingly delivers grease or oil to each bearing—as much as you want, exactly measured—as often as desired. Indicators at every bearing show that each valve has functioned.

Write for Bulletin 25 for full details. The Farval Corporation, 3252 East 80th Street, Cleveland 4, O.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.



E. Eugin
Wabb

Our Metallurgists Will Help Solve Your Defense Order Problems

Almost every day some manufacturer comes to us with a new steel problem with which he is confronted in connection with defense contracts. In some cases he needs detailed information on grades or qualities of steel to produce specified results. In others he has questions about sizes of rough stock, processing details, heat-treatment, or machining. Usually our metallurgists are able to come up with the right answer.

If you happen to run into any situation where you need metallurgical advice concerning defense orders, let us know about it. We will do our best to help. And you can rest assured that our advice will be given from an unbiased viewpoint, for we manufacture practically all grades of steel and we have no special products that we are interested in promoting.

This service will cost you nothing; it may prove to be of considerable value.

If you need steel, remember that Bethlehem is a dependable source for all of the AISI alloy grades in addition to the full range of carbon and special steels. For full information, call or write our nearest sales office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM ALLOY STEELS

BETHLEHEM STEEL

IRON AGE

OCTOBER 4, 1951 VOL. 168, NO. 14

East Engin. Library
TS 300 .I6 49

THE IRON AGE
Editorial, Advertising and Circulation Offices, 100 E. 42nd St., N. Y. 17, N. Y.

GEORGE T. HOOK, Publisher
TOM C. CAMPBELL, Editor

EDITORIAL STAFF

Managing Editor George F. Sullivan
Technical Editor Darwyn I. Brown
News-Markets Editor Wm. V. Packard
Machinery Editor George Elwers
Associate Editors: H. W. Van Camp, F. J. Winters, R. L. Hatschek, John Kolb, Ted Metaxas, W. B. Olson; Art Director: Carl Cerminaro; Regional Editors: E. C. Beaudet, Chicago; W. W. Taylor, Cleveland; W. G. Patton, Detroit; John B. Delaney, Pittsburgh; R. T. Reinhardt, San Francisco; George H. Baker, Karl Rannells, Ray M. Stroupe, Washington. Correspondents: Fred L. Allen, Birmingham; N. Levenson, Boston; Fred Edmunds, Los Angeles; James Douglas, Seattle; Roy Edmonds, St. Louis; F. Sanderson, Toronto; F. H. Harley, London, Enland; Chilton Editorial Board: Paul Wooton, Washington Representative.

BUSINESS STAFF

Production Manager B. H. Hayes
Director of Research Oliver Johnson
Mgr. Circul'n & Promotion C. T. Post
Asst. Promotion Mgr. James A. Crites
Asst. Dir. of Research Wm. Laimbeer

REGIONAL BUSINESS MANAGERS

B. L. Herman, Philadelphia; Stanley J. Smith, Chicago; Peirce Lewis, Detroit; Paul Bachman, New England; Charles R. Lippold, Cleveland; R. Raymond Kay, Los Angeles; C. H. Ober, New York; J. M. Spackman, Pittsburgh; Harry Becker, European Representative.

REGIONAL OFFICES

Chicago 3, 10 S. LaSalle St.; Cleveland 14, 1016 National City Bank Bldg.; Detroit 2, 103 Pallister Ave.; Los Angeles 28, 2420 Cheremoya Ave.; New England, 62 La Salle Rd., W. Hartford 7; New York 17, 100 E. 42nd St.; Philadelphia 39, 56th & Chestnut Sts.; Pittsburgh 22, 814 Park Bldg.; San Francisco 3, 1355 Market St.; Washington 4, National Press Bldg.; European, 111 Thorley Lane, Timperley, Cheshire, England.

Circulation Representatives: Thomas Scott, James Richardson.

One of the Publications Owned and Published by Chilton Co., Inc., Chestnut & 56th Sts., Philadelphia 39, Pa.

OFFICERS AND DIRECTORS

JOS. S. HILDRETH, President

Vice-Presidents: Everit B. Terhune, G. C. Buzby, P. M. Fahrendorf, Harry V. Duffy, William H. Vallar, Treasurer; John Blair Moffett, Secretary; Maurice E. Cox, George T. Hook, Tom C. Campbell, Frank E. Tighe, L. V. Rowlands, Directors. George Maiswinkle, Asst. Treas.

Indexed in the Industrial Arts Index and the Engineering Index. Published every Thursday by the CHILTON CO. (INC.), Chestnut & 56th Sts., Philadelphia 39, Pa. Entered as second class matter, Nov. 8, 1932, at the Post Office at Philadelphia under the act of March 3, 1879. $8 yearly in United States, its territories and Canada; other Western Hemisphere Countries $15; other Foreign Countries, $25 per year. Single Copies 35c. Annual Review and Metal Industry Facts Issue, $2.00. Cable address "Ironage" N. Y.

Member

Audit Bureau of Circulations

Society of Business Magazine Editors

National Business Publications

Copyright, 1951, by Chilton Co. (Inc.)

CONTENTS

★Starred items are digested on opposite page.

EDITORIAL Boundaries Unlimited 7

NEWS OF INDUSTRY

★Special Report: Aluminum Seeks Power Sources 175
★Power: Refute Shortage Prediction 176
Iron Ore: Expect Record Shipments 177
★Press: Labor Gets Its Story Across 178
★Strike: Caterpillar, Union Settle 179
Pipe: Plating Process Saves Nickel 180
Controls—Lead Under CMP? 182
Defense Contracts 192
Construction Steel News 196
Industrial Briefs 202
Personnel: Iron Age Salutes 215
Personnel: Iron Age Introduces 217
Clearing House 416

NEWS ANALYSIS

Newsfront 173
★This Week in Washington 199
Automotive Assembly Line 204
West Coast Report 209
★Machine Tool High Spots 211

TECHNICAL ARTICLES

Metallurgists of Free World to Meet In Detroit 223
Technical Program of The Metal Show 224
★British Report on All-Basic Openhearth 225
★Nodular Iron Hot-Formed and Rolled Experimentally 229
New Books 233
Welding Notebook 234
Uncle Sam's Aluminum Needs 236
New Tubing Joint Gives High Leak Resistance 238
Suggested Emergency Steel Alternates 239
Nonferrous Alloy Specifications 240
Arcwelding Electrode Chart 245
Exhibitors at The Metal Show 256

MARKETS & PRICES

★The Iron Age Summary—Steel Outlook 383
Market Briefs and Bulletins 385
Nonferrous Metals Outlook 386
Iron and Steel Scrap Market 388
Iron and Steel Scrap Prices 390
Comparison of Prices 392
Steel Prices 394
Warehouse Prices 397

REGULAR DEPARTMENTS

Dear Editor 9
Fatigue Cracks 11
Conventions and Meetings 13
Free Publications 365
New Equipment 371

INDEX OF ADVERTISERS 442

DIGEST

of the week in metalworking

Special Metal Show Issue

The size of this issue is indicative of the interest in the 33rd National Metal Congress and the First World Metallurgical Congress to be held in Detroit, Oct. 13-19. A summary of the major events appears on p. 223, followed by the complete technical program. A full listing of exhibitors starts on p. 256.

In addition to the technical features summarized below, case histories of knotty welding problems are featured on p. 234, followed by a list of fabricated aluminum items which the Armed Forces want to buy. The first published table of emergency steel alternates for standard alloy grades appears on p. 239. Don't miss the Nonferrous Alloy Specifications—they are complete with the latest information available.—*The Editors.*

PAGE 175 **ALUMINUM TURNS TO NEW POWER SOURCES**
The aluminum industry is today being forced away from its cheapest power source—water power. Except for two plants, all facilities planned after the Korean War will use natural gas or lignite. About 67 pct of new plants will work with non-hydro power. Bituminous coal is another possibility.

PAGE 176 **RAP WASHINGTON POWER SHORTAGE GUESS**
Washington crystal balls have been guessing wrong on power shortage for the past 15 years, says the Edison Electric Institute. It regards the latest gloomy prediction as another cry of "wolf." There is no real shortage now, except in the Pacific Northwest where drought has cut water power.

PAGE 178 **LABOR PAPERS GET UNION'S STORY ACROSS**
A high-power newspaper publishing system is putting labor's story across to its members and the opinion-molders. Tops on the list is "Steel Labor" with over 1 million circulation. It started with mill gate distribution and now is "big business," with separate editions for various areas.

PAGE 179 **CATERPILLAR, UNION SETTLE LONG STRIKE**
A 2-month dispute over wages ended last week at Caterpillar Tractor Co. An increase of 13½¢ per hr was won by the union. But in the wake of the strike were losses to industry, community, and workers. Retail business had slowed almost to a standstill. Work on defense contracts had halted.

PAGE 199 **FLICK ON GREEN LIGHT FOR STEEL GROWTH?**
Washington has given steelmakers unofficial but binding assurances that expansion will not be curbed by allocation cuts after Jan. 1, 1952. Mobilizer Wilson said allotments for expansion will be calculated to assure completion of plans as soon as possible. Priority help may be established.

PAGE 211 **TOOLMAKERS EXPAND DESPITE RISK TALK**
Talk on how risky and tough it is for a machine tool builder to expand may be hiding the fact that the industry has undertaken a substantial growth project. However, toolmakers won't expand as much as backlogs seem to indicate is needed. They remember hard times and are playing safe.

PAGE 225 **BRITISH REPORT BASIC OPENHEARTH DATA**
Four basic openhearth furnaces in the United Kingdom and in Holland have completed 5 campaigns. Indicated advantages include increased output, faster bricking, less downtime, and most important, use of liquid fuels. Built-in pressure indicators help in furnace design and construction.

PAGE 229 **NODULAR IRON CAN BE ROLLED AND FORGED**
Nodular iron can be rolled or forged to obtain structures and properties not available when it is cast. High rolling temperatures and increased reduction give improved mechanical properties. Edge cracking reduces width yield to 80 pct. Forgings, plates, and bars have been manufactured.

PAGE 383 **STEEL PEOPLE WILL SEEK CHANGES IN CMP**
Steel producers and consumers are dissatisfied with the slowness with which steel distribution is settling into the right channels. Their advisory people will soon ask NPA to make some basic changes in CMP. Better screening of demands of claimant agencies is expected to smooth rough spots.

NEXT WEEK **ALCOA USES DIRECT-READING SPECTROMETER**
High-speed analysis of aluminum alloys on direct-reading quantometers cuts waiting time of Alcoa's holding hearths to a minimum. Of 7 million annual determinations, 60 pct are now made by this method. Figure will be 80 pct by year's end. Complete report takes no longer than 4 min.

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

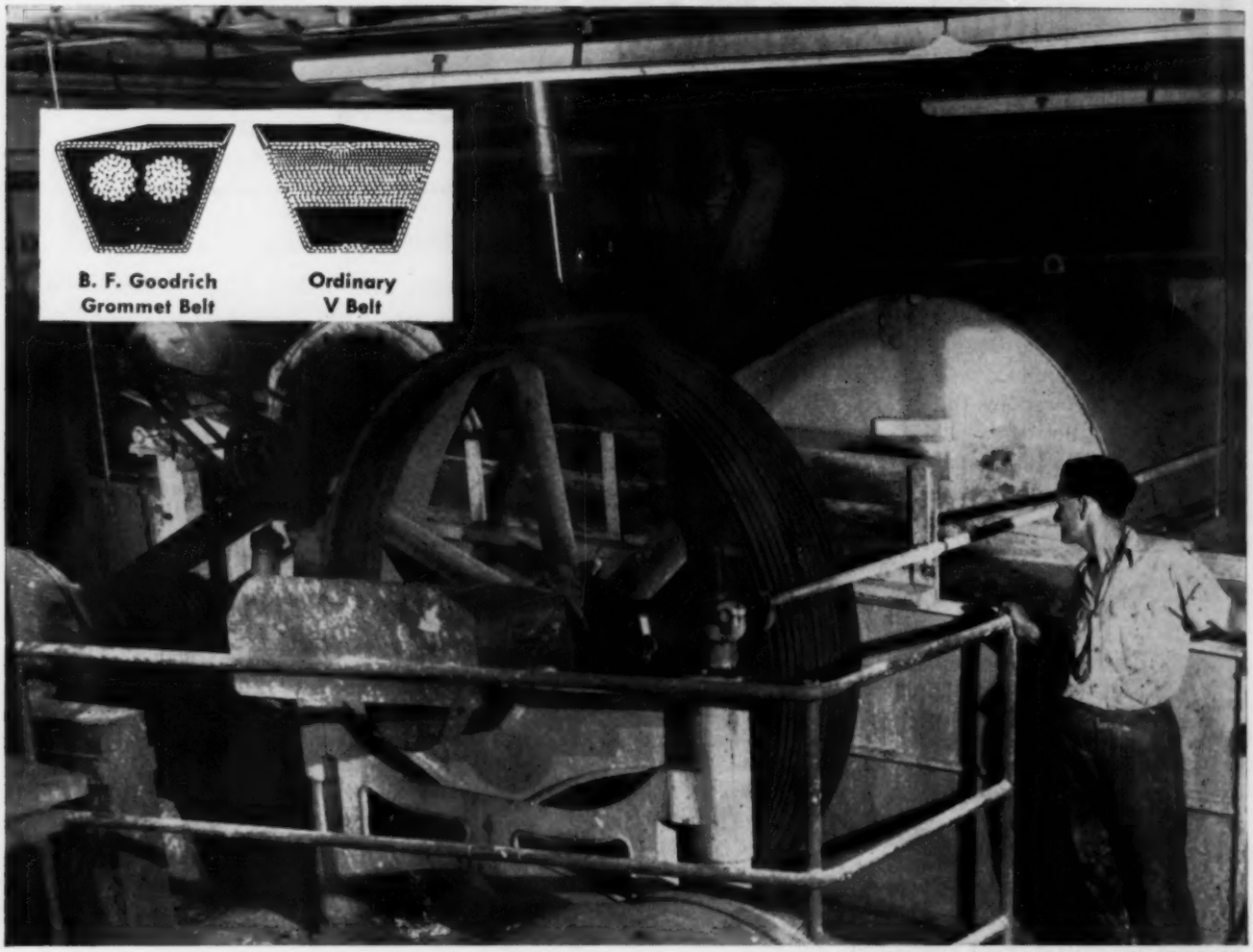


Photo courtesy Harding-Jones Paper Co., South Excello, Ohio

Drive headache cured with B. F. Goodrich grommet belts

B. F. Goodrich grommet V belts cut costs 20 to 50%

HERE was one of the biggest drive problems in this plant. The machine shown in the picture runs 24 hours a day, 7 days a week. Belts previously used couldn't handle the job. Motor bearings were burning out, belts were snapping under the shock load.

Then a B. F. Goodrich distributor suggested grommet belts to stand the jerks and hard pulls. Installed nine months ago, B. F. Goodrich grommet belts are still going strong, and look good for many more months of use. Here's why BFG grommet belts give longer service, save maintenance costs:

Endless — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping cord sections. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless grommet belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip — Because a grommet is endless, a grommet belt is more flexible, grips the pulleys better. Size for size, grommet belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich makes the grommet!—No other multiple-V belt is a grommet belt (U. S. Patent No. 2,233,294). Now available in C, D and E sections. See your local B.F.Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. *The B.F.Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

Grommet Belts BY

B.F.Goodrich

RUBBER FOR INDUSTRY

The Iron Age
FOUNDED 1855

Boundaries Unlimited

IN free nations you can usually go to another plant and talk things over with someone in the same business as yourself. Unless it is highly competitive information in its early stage you probably can have the freedom of the plant with all questions answered.

Free men have always exchanged letters and papers on industrial progress. By mail and by business publications people abroad have kept abreast of recent techniques and advances. This does not apply to Russia and her cronies.

Once in awhile a group visits this country or one of our groups goes abroad. Much is learned besides the industrial angle. New friends are made. Better understanding results and a deeper bond of friendship is forged.

Thanks to the enterprise of William H. Eisenman, of the American Society for Metals, and the miracle work of Dr. Zay Jeffries, several hundred metal experts from abroad are in this country. Dr. Jeffries worked hard to see these people and invite them to the World Metallurgical Congress held in conjunction with the National Metal Congress and Exposition at Detroit, Oct. 13th through 19th.

Backed by the Economic Cooperation Administration these industrialists from abroad have spent about 6 weeks in this country. Through the cooperation of industry, plant visits and inspections have been made in a score of centers. The wind-up will come at the Metal Congress.

Much has been learned by the visitors and much has been learned from the visitors by American metal experts. It has been a free exchange of industrial help and ideas.

When these men return home they will tell what they saw and heard here. Our examples of what we think and how we act were open and above board. They will bear retelling to those who have not visited these shores.

Meeting people face to face is a good way to get acquainted. This is one big experience which will pay off—for both host and visitor. A good start has been made. The boundaries are unlimited.

Tom Campbell

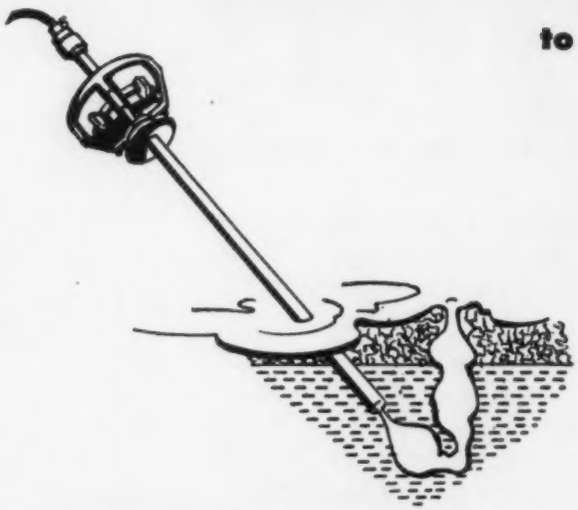
Editor

For more profitable heats

choose

IMMERSION RAYOTUBE or IMMERSION THERMOCOUPLE

to measure temperatures in the steel bath



THE IMMERSION RAYOTUBE is plunged beneath the surface of the bath . . . sights on an air pocket blown in the steel . . . reports temperature to a Speedomax Recorder.

THE IMMERSION THERMOCOUPLE is immersed until couple reaches bath temperature . . . a process guided by signal lights and charted on a Speedomax Recorder.

Open hearth and electric furnace shops can now choose between two tested L&N methods for measuring steel temperatures during the melt. Either the Immersion Rayotube or Immersion Thermocouple is plunged momentarily beneath the surface to measure the interior temperature of the bath, while a dependable Speedomax Recorder displays the information where all concerned can use it.

Either method helps improve ingot production by warning if the steel is too hot or too cold for normal pouring. Authorities* have found that some ingots from as many as 44% of overheated melts will stick to the molds, resulting in loss of production time, while as many as 52% of underheated melts will lose yield through formation of skulls in the ladle. *Both of these losses have been sharply cut in every plant where temperature is properly measured while the melt is finished off for tapping.*

Investigate the choice of immersion methods L&N offers to meet plant requirements. *In general,* Rayotubes are employed in heavy-duty shops where several readings may be taken every hour, while thermocouples—although sometimes preferred for such service—find wider application to small or special furnaces. However, a number of factors determine the final choice. Let our experienced engineers analyze your measurement problems and help your staff select the proper equipment.

Contact our nearest office, or write us at 4956 Stenton Avenue, Philadelphia 44, Pa.

* Clark and Feigenbaum of J&L, in AIMME Technical Paper 2031.

LEEDS NORTHRUP

Jrl Ad N-33-640(2)

Dear Editor:

(Letters from Readers)

Thanks!

Sir:

I was very interested to read on p. 3 of your Sept. 13 issue "A Letter to Our Readers," (explaining the changes in Iron Age format).

I think the new arrangement of material is fine and is certainly a tremendous improvement over the previous set up.

L. A. POST
Executive Vice-President
American Institute of Steel Construction
New York

Page Aesop

Sir:

I have read the editorial "There Is No Easy Way" in your Sept. 13 issue.

I don't scare easily, and a threat of war or the possible loss of my American rights and privileges only make me more determined to fight. I exert myself to the fullest extent of my energies and capabilities—so do you, so do a lot of other young American men and women. I do not mind this exertion when the need for it is real!

Lately, however, I have been wondering if all the many controls are really necessary, if the frantic quality of the actions in Washington can be justified. I would not question any taxation if the projects for which the money is to be spent are justly needed, but are they?

Is the tremendous budget the result of extensive research? Have all the items been examined for excesses? Is my money (and yours) being spent to the best possible advantage? If it is, then I say, "Fine! I'll continue to do without some of the luxuries I might enjoy having. I'll budget my own expenses to live within the limit placed upon my earnings." Too often of late, though, I have been thinking of the shepherds and the boy who cried, Wolf!

I only hope that, like those shepherds, I have not been deluded by a group of men, like the boy in Aesop's fable, who just want to see what the reaction would be to the cry.

It would be a farce indeed if a real danger presented itself and I would not believe the shouts of "Wolf" because I had been duped too many times.

Is there a wolf? I think not.

F. D. ROWLEY
Copperweld Steel Co.
Warren, Ohio

Boron Steels

Sir:

I have read with interest your article on boron steels in the July 5 issue.

Do you happen to know of any published or unpublished data on the effect of boron on the elevated temperature creep strength? If you do not know, can you refer me to someone who might?

J. L. CARLTON
Research Engineer
Edward Valves, Inc.
East Chicago, Ind.

Unfortunately boron used in the amounts in the standard engineering steels covered in the boron steel series does not increase the elevated temperature properties of these alloys. However, there is data available on special boron steels containing much more boron which do show increased creep strength. The latest reference we know of is "Boron-Titanium Steel for Intermediate Temperature" by S. F. Urban (THE IRON AGE, June 6, 1949). Since that time additional research has been done, but as yet the data is unpublished. We hope to carry this unpublished data as a technical article sometime late this year.—Ed.

Rare Earths

Sir:

On p. 99 of your Sept. 13 issue there is an item referring to the addition of rare earths to certain wrought steel alloys of the 4100 and 4300 series.

Will you please send us more information regarding this subject, if possible.

H. D. STUCK
Vice President
John W. Bolton & Sons, Inc.
Lawrence, Mass.

Sorry we can't give you further information at the moment. We hope to be able to secure a manuscript at a later date. —Ed.

Continuous Casting

Sir:

I am writing in request for 3 tear sheets of your article on the Hazelett process entitled "Continuous Casting Process Employs A Moving Mold" appearing in your Jan. 25, 1951, issue.

A. P. OOT, JR.
Metallurgical Laboratories
Magnesium Div.
The Dow Chemical Co.
Midland, Mich.

Can Be Had

Sir:

Please refer to p. 71 of your Aug. 30 issue, reference "Standard Methods of Analysis of Iron, Steel and Ferro-Alloys."

We shall appreciate your advising whether or not, or from whom, this book may be purchased in the United States.

C. E. TOMLIN
R. G. LeTourneau, Inc.
Toccoa, Ga.

Stechert-Hafner, Inc., 31 E. 10th St., New York 3, N. Y., can import this book for you.—Ed.

WILL KEEP YOUR ASSEMBLY LINES AT PEAK CAPACITY

Whatever you manufacture or assemble, you can speed production and improve your product by using Pheoll screws, bolts and nuts. These industrial fasteners drive easy and straight, and will not bind because threads are accurately rolled or machined. Precision-made screw and bolt heads, slots and head recesses prevent wrench and driver slippage. Count, too, the added bonus you receive by using fasteners that improve product appearance.

An interesting story on standard and special industrial fasteners and their profitable applications to your needs may be obtained from experienced Pheoll engineers. Ask these men to recommend screws, bolts and nuts that will increase your overall profits on assembly line work.

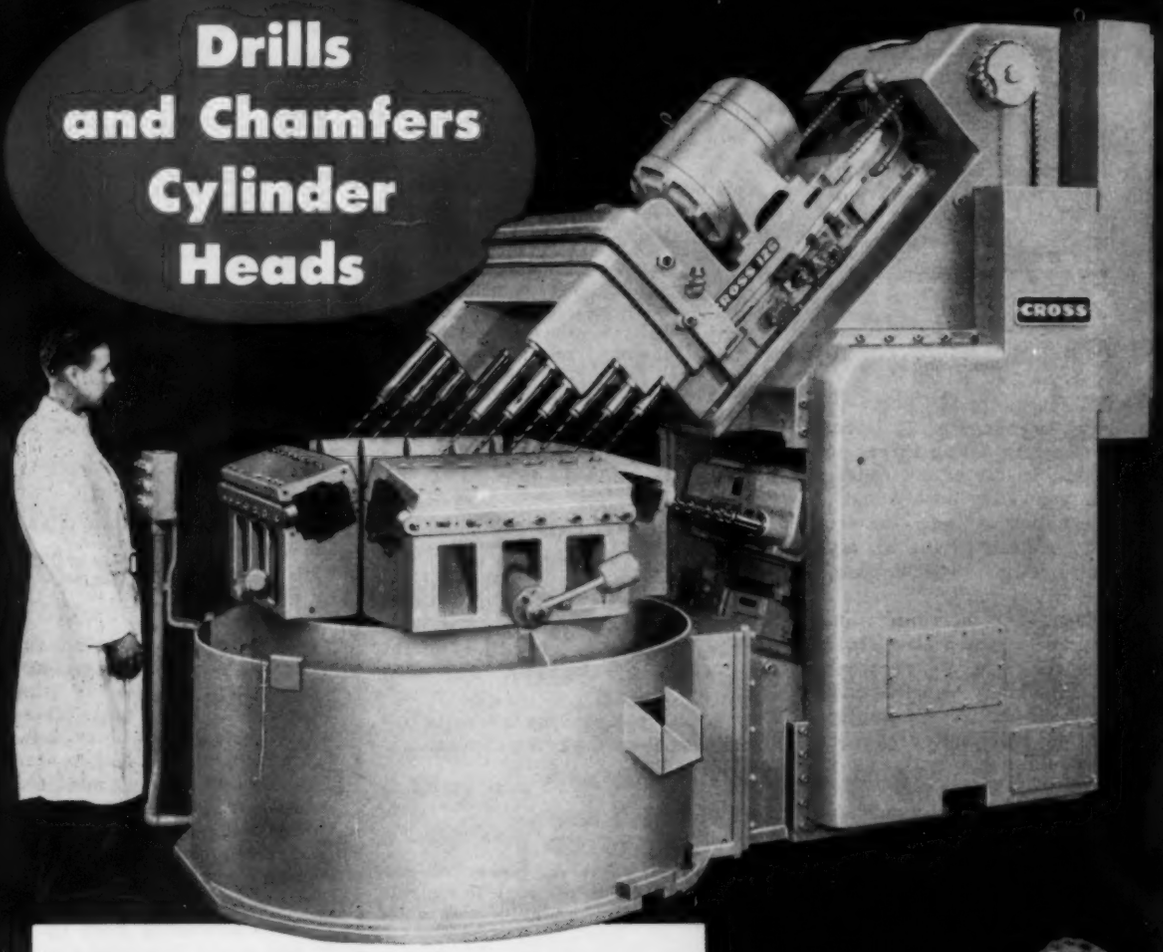
these Pheoll products prevent production lag

Tapping Screws • Cap Screws • Sems • Phillips Recessed Head Screws and Bolts • Machine Screws • Special Fasteners • Thread Cutting Screws

Pheoll MANUFACTURING COMPANY
5700 ROOSEVELT ROAD
CHICAGO 50, ILLINOIS
SCREWS • BOLTS • NUTS

Another Special by Cross

Drills and Chamfers Cylinder Heads

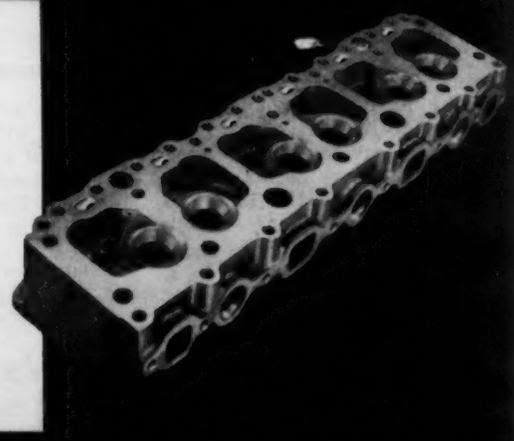


★ Drill 12 angular holes and countersink 8 manifold mounting holes in cylinder heads.

★ 170 pieces per hour at 100% efficiency.

★ Fluid motor, power driven index table.

★ Other features—J.I.C. standard construction; stranded wire electrical installation; hardened and ground ways; hydraulic feed.



Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

Fatigue Cracks

By Charles T. Post

A Penny for ?

Conflicting evidence surrounds the penny situation. The lady who runs the U. S. mint says there is a terrific shortage. The customers are yelling for pennies but she is having trouble getting copper from her suppliers. Besides, the stuff is all wound up in government regulations and red tape, and a small metalworking business like the U. S. mint doesn't have enough influence in Washington to do much about it, my dear.

On the other hand, another lady (the women are running the country these days), who makes toy kiddies' banks in Hackensack, says her firm is dropping the penny model. The brats aren't interested in saving pennies any more. From now on, it's nothing but nickel, dime, and quarter models. And, confidentially, the nickel model is a slow seller.

Well, we suspected it for a long time. Little Charlie, age 9, is demanding and getting 50 cents an hour for mowing our lawn and weeding the flower beds and what's more is trying to subcontract the work back to us so he can work for the people next door at a higher wage. What does he know of a penny that would buy a licorice whip, a butterscotch jawbreaker, or a penny that, invested in a friendly game of lagging to a line, might provide funds for a week?

Next thing you know, none of the coins will be in demand. Only folding money. Then all the people who work for metalworking outfits like the mint and toy bank manufacturers will be out in the cold. "Technological unemployment," they'll call it. The economists will say that, although metalworking still is growing, here are exceptions that prove the trend.

Contain Her Industry

We note that the New York chapter of the American Society for Metals is holding its meeting next week at the Latin Quarter night club. Top feature on the program is "the real French can-can." There's nothing like finding out what the foreigners are doing with all this tin plate we are sending them, the metallurgists feel.

npossible

W. C. Rosborough, treasurer, Moline Tool Co., points out to your f.f.j.'s Stanley-J. Smith that the Office of Price Stabilization has done the impossible:

"Just take a look at Price Regulation 57. It freezes anti-freeze!"

Looks like a cold winter.

Aptronyms

We draw on Seattle's C. C. Finn, your f.f.j.'s chief aptronym collector, for the following intelligence:

Ernie Foreman is a general foreman with Boeing. William Hay is a farmer near Crystal Lake, Wash. Dr. Safety R. First is the new consulting internist for the Frisco Railroad employees' hospital association. Out in California, Carrol Sugar and Laurel Cane were so sweet on each other that they got married. Joseph F. St. Peter quit his job in the Washington morgue. When he answered the telephone, people got sore. Leroy L. Dry ran into three cars, including a police prowl car, got thrown in the pokey for driving while not being like his name. What's in a name?

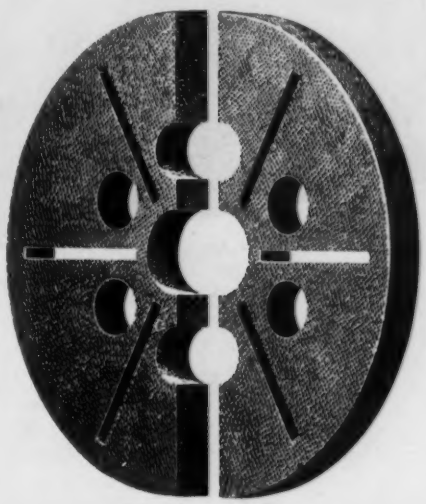
Puzzlers

There are various combinations that will get everyone down from the tower but they all require eleven steps. So far we have heard from A. S. Lott, Department of Defense, R. W. Huff, Canton, O., C. R. LeVine, U. S. Navy Department, E. Korostoff, Leeds & Northrup Co., B. Mitchell, Smith & Wesson, Inc., and C. E. Blass, Talon, Inc. H. Stein, Committee for Economic Development, sent along two solutions and his secretary, Isobel Baxter, included one of her own. She wants to be placed on our "cracked" typist list.

R. N. Hill, Lakeland Engineering Associates, Inc., says that the steel mill problem was right down his alley.

R. W. Huff thinks it's time to dust off the slide rules so he submits the following: What is the diameter of an inscribed sphere in a tetrahedron with base edges of 46.23, 49.3 and 35.2 inches respectively and lateral edges which are mutually perpendicular at the vertex?

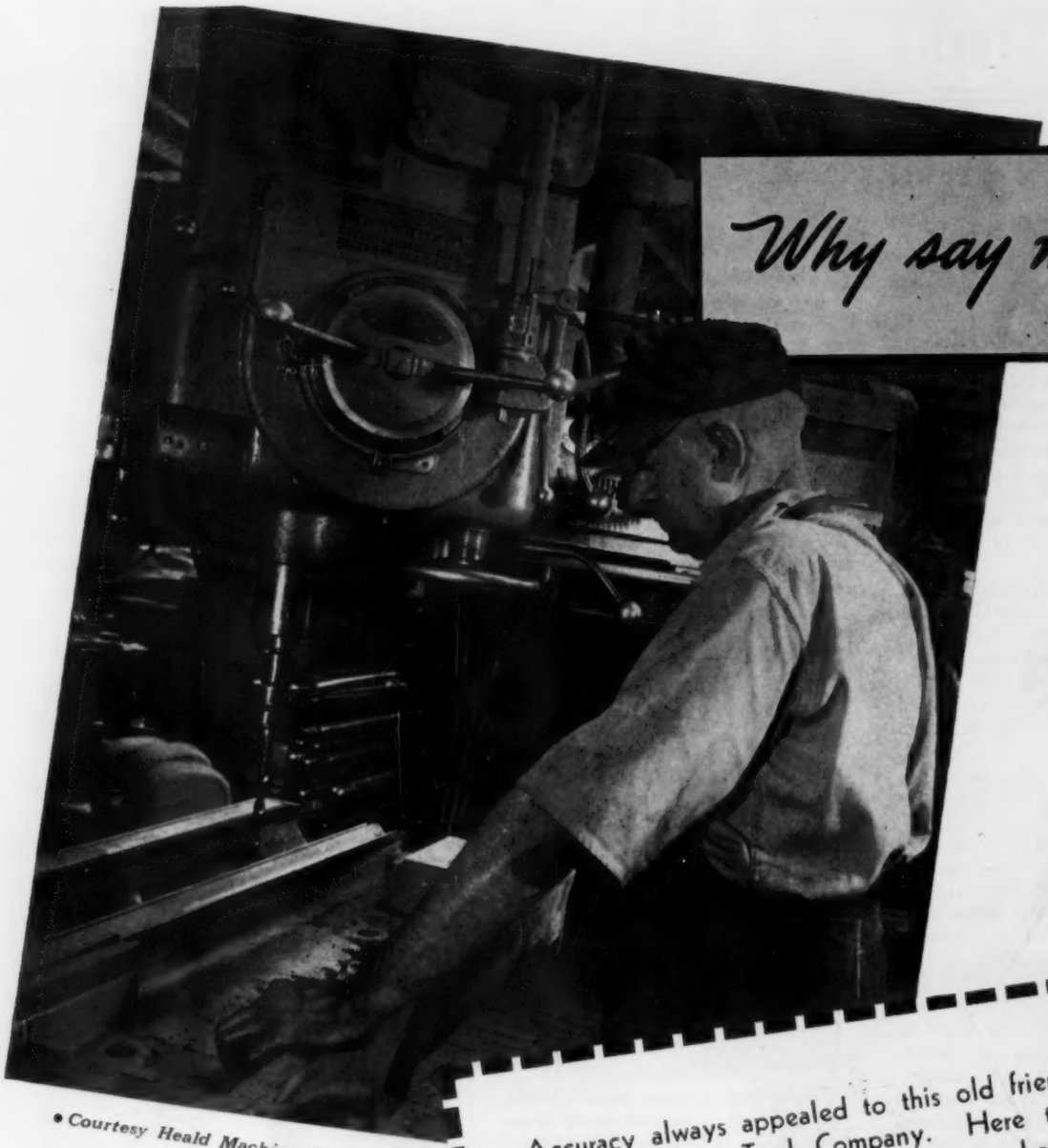
Western Felt users over a long period of years have placed their stamp of approval on a long list of its products. They know from experience the "plus value" in every Western Felt component part. Highest precision in its processing and cutting produces a uniformity that minimizes rejections—prevents failure of the finished product from felt causes. They are available from wool softness to rock hardness—never lose shape—do not ravel or fray—resist oil, water, age—are resilient, flexible, compressible—may be cut to close tolerances.



WESTERN Felt WORKS

4035-4117 Ogden Ave., Chicago 23, Illinois
Branch Offices in Principal Cities

Acadia Synthetic Products Division, WESTERN FELT WORKS, Processors of Synthetic Rubber — Sheets, Extrusions, Molded Parts.



Why say more?

• *Courtesy Heald Machine Tool Company*

Accuracy always appealed to this old friend—The Heald Machine Tool Company. Here they are boring, facing and reaming numerous holes in a 1360-lb. casting.

They say, and we quote: "We bought this Cincinnati Bickford Super-Service Radial Drill to increase war-time production. We also have ten large and a flock of smaller ones. Why say more?"

Cincinnati Bickford Super-Service Radial Drills are always accurate, dependable tools, highly productive and profitable in the shop.

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.

THE IRON AGE Newsfront

► Nodular graphitic iron castings made by a new method are now under test. This method does not employ the regular magnesium compound.

► The recent increase in domestic vanadium production is coming from an unexpected source. The alloy is a byproduct of the increased uranium ore production.

► A mobile television station designed by the Signal Corps has been built. The equipment is housed in four 31 ft busses and will be used to test TV as a method of field instruction.

► Boron Steel production is picking up speed. August production was 25,000 net tons, September, 37,000 net tons, and so far about 40,000 net tons have been approved for the October melt schedule.

► The Navy's new and largest blimp, the ZPN can fly backwards. Curtiss-Wright "Zep-Props" enable the blade angle to be changed without stopping the engines. Quick stops and evasive tactics have thus been added to submarine hunting.

► The bureaucrats have settled the old metallurgical argument of how low a low alloy steel should be. CMP has now declared that low alloy high strength steels will be considered as carbon steels on the melt schedules. What they mean is that no virgin alloy will be allocated to make such grades and that all the necessary alloys must be secured from scrap. Unless better scrap segregation is enforced, this is as low as they can possibly get.

► France has for years had price and rent controls on housing. Which may explain why at present rates the housing shortage there will not be over until the year 2002.

► Recent experiments on desulfurizing in an electric furnace employ a regular Basic Refractories Inc. gun. Pulverized burnt lime is discharged into the bath under nitrogen gas pressure. The BRI gun is usually used to repair furnace side walls and bottoms.

► Six emergency boron steels may soon be tentatively adopted as standard steels. They are 40B37, 80B37, 14B35, 50B50, 50B60 and 81B40. Four boron steels have already made the grade, TS 50B46, TS 86B45, TS 94B17 and TS 94B20.

► Quebec Iron and Titanium Corp. will ship this year a total of 340,000 gross tons of ilmenite ore from their mine at Allard Lake, Canada to the Sorel smelter. By mid-1952 Sorel's full capacity on five furnaces is expected to be producing 700 tons of high-grade TiO_2 slag per day.

► A very ductile conduit to be shipped in spools may soon be in production. This conduit intended for radiant heating will cut down the large welding labor cost of present installations.

UNITED

ROLLED THREAD STUDS

MILLED STUDS THREADED ROD

Milled studs are carried in stock from ¼" x 1" to as large as 1¼" x 12". Special milled studs are made to the most exacting specifications and in any desired quantities.

We have extensive facilities to roll thread any special studs you require, from 2-56 thread and larger. Continuous threaded rod can be furnished in any thread diameter up to and including ⅝", and in lengths measured in inches or in feet.

You will find "UNITED" a good source for your requirements.

—when you think of fasteners think of United

SCREWS · NUTS · WASHERS
CLUTCH HEAD SCREWS
STAMPINGS

United Screw and Bolt Corporation

Chicago 8 Cleveland 2 NewYork 7

ALUMINUM: Growth Depends on Power

Electricity is up to a fifth of total mill cost . . . Industry being forced to give up water power . . . Turning to gas and lignite, possibly coal, for expansion answer—*By Bob Hatschek.*

Aluminum production is vitally dependent on large sources of cheap, uninterruptible electricity. The cost of this power, which must be available 24 hr a day, averages 15 to 21 pct of total mill costs for producers in this country. And it requires almost 10 kwhr of electrical energy to make a pound of the metal.

Today, the industry is being forced away from the cheapest source—water power. Until 1942, all aluminum used hydroelectric power. In that year the Jones Mill, Ark., reduction plant started using natural gas. Then a gas powered smelter was built at Point Comfort, Tex.

Gas or Lignite — Since the Korean war all proposed facilities have been planned for either natural gas or lignite with but two exceptions, Aluminum Co. of America's plant at Wenatchee, Wash., and Harvey Machine Co.'s controversial plant at Kalispell, Mont. In other words, 67.1 pct of the new facilities would be based on non-hydro power. Now there is even objection in some quarters to giving hydro power to the remainder.

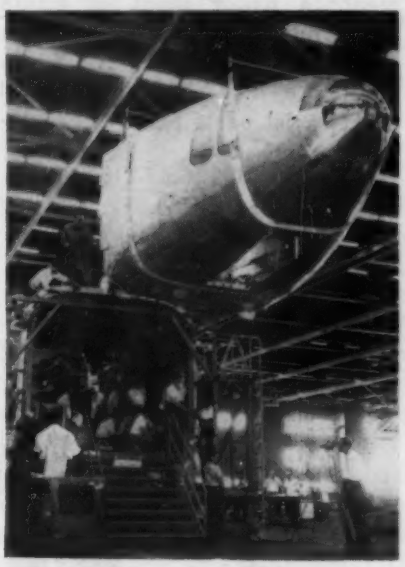
It costs about 0.6¢ to 1¢ per lb of aluminum for a producer to generate his own water power (though additional sites aren't available). It costs about 2¢ per lb to buy it from Bonneville Power Administration and about 3¢ per lb to buy it from Tennessee Valley Authority or use natural gas.

No figures are available on lignite but cost estimates made by Alcoa lead that company to believe it will be competitive with natural gas.

Want Their Share—The industry is getting desperate in its search for power sources. Development of the hydro power potential in the Pacific Northwest is only about 10 pct complete and aluminum producers would like to get a good share of the rest when it is installed.

But they're not sure of getting it. There is also fear that natural gas reserves will be consumed too rapidly if aluminum swings heavily to that fuel.

These are some of the reasons for Alcoa's decision to try lignite at Rockland, Tex. Still another possibility, though probably even more expensive, would be bituminous coal. Use of this fuel would also dictate the location of any reduction plant.



THE NEED: Aluminum sheets are fashioned into the bodies of airplanes. With the spurt of aircraft production now scheduled, plane makers will demand still more of the metal. Scene above shows production of C-119 Fairchild Flying Boxcar at the Kaiser-Frazer Willow Run plant.

Natural gas can be used in competition with hydro power because of its availability in the South. This location cuts down the length of raw material supply lines. And with water power rates continually increasing, the cost differential is diminishing despite rising costs for natural gas.

Alaskan Plant — Some in the aluminum industry are thinking about going to hydro power sources outside the U. S. Main objections to building plants in other countries are possible foreign tax set-ups and U. S. tariffs.

Mentioned some time ago but not publicized lately was the idea of locating a plant in Alaska. Power potential there is great but development would be slow and raw material transportation costs would go up.

The metal is vitally needed for defense now and there is a huge potential civilian market for aluminum (THE IRON AGE, Sept. 20, 1951, p. 71). Production must be increased—soon. And it is primarily dependent on large amounts of cheap power.

To Conserve Power — After querying the producers, Washington officials have decided against moving any potlines out of the Northwest. Instead, they are going to employ plans for the conservation of power.

To eliminate the need for this extreme measure as soon as possible, artificial rainmaking will be tried and construction of new power developments will be accelerated.

POWER: Refute Shortage Prediction

Electric Institute says Washington has predicted power shortages for 15 years . . . There's no real shortage except for Pacific Northwest . . . Equipment delivery slow—*By John Delaney.*

Washington crystal balls for the past 15 years have been showing alarming pictures of impending power shortages and for 15 years they have been dead wrong. If any power shortages do arise because of metal scarcities cutting down production of generating equipment, they will be spotty and not so critical as government officials believe.

This is the opinion of the Edison Electric Institute, an association of electric utility companies. The Institute flatly contradicts another pessimistic power prediction made by Thomas E. Marberger, director of the materials and equipment division, Defense Electric Power Administration.

Wolf Calls—"We're tired of hearing Washington people cry wolf about power," said an Institute spokesman.

Except for the Pacific Northwest, where a drought has temporarily forced curtailment of power to industry, particularly aluminum producers, there is no real shortage of power in the country, according to EEI.

At the same time, the Institute agreed that in certain areas, including Pittsburgh, it may be necessary to effect limited curtailments during periods of peak consumption. This would, as it has in the past, affect electric furnace production.

Demand Drops—The Institute reports that nationwide power output is dropping off due to reduced demand from industry. During the week ended Sept. 22, this output totaled 7,014,000,000 kwh, an increase of 8.6 pct over the same period last year. But in the previous week output totaled 7,137,000,000 kwh, an increase of 10.7 pct over the previous year.

The decline in power requirements is particularly noticeable in Detroit and Cleveland, the Institute said.

Concerning requirements for the defense program, EEI does not expect demand to grow nearly as much as Washington predicts.

The utility companies have been experiencing difficulty getting deliveries on generating equipment. General Electric and Westinghouse, says EEI, will slip back something like 7 million kw in deliveries of generating equipment over the next 2 years.

This, the Institute said, is due to inability of the manufacturers to obtain critical materials such as steel and copper in the quantities needed.

But, even so, the Institute is confident things won't be too bad.

Expansion

More Growth:

Westinghouse to spend $296 million in second, greater plant project.

A second expansion program costing $296 million and extending past 1953 will be started by Westinghouse Electric Corp. A project involving about $150 million was completed in 1948, increasing manufacturing facilities by 50 pct.

Already undertaken in the new expansion program are: a new plant in Raritan Township, N. J., soon to make electronics equipment; a motor plant at Union City, Ind.; electronic tube plants at Elmira and Bath, N. Y.; a Baltimore airplane armament plant; a jet parts plant at Columbus, Ohio; an expanded plant for generator output at E. Pittsburgh, Pa.; five new lamp plants; purchase of a plastics plant at Hampton, S. C.; and plans to increase TV and household appliance output.

Stockholders will meet in December to vote on increasing authorized debt from $150 million to $500 million.

"What can I say to him? He's actually getting his work done."

Another Expansion Round for GE

About $450 million will be spent by General Electric for expansion in the next 4 years. This will duplicate the sum spent by the firm since 1947, said Phillip D. Reed, chairman, and Ralph J. Cordiner, president, in Chicago.

The two officials said that the full effects of cutbacks will be felt in the fourth quarter this year and that civilian production would plunge about 50 pct in 1952.

Now, the company is putting 20 pct of its production into defense and by next year the percentage will climb to one-third. The GE officers indicated that deliveries of electric generating equipment had not lagged to date but supply crises in the future might work against this type of production.

In Danville, Ill., Chester H. Lang, GE vice-president, revealed that the firm holds $550 millions in defense contracts and that more than 50 pct of these would filter down to about 17,000 subcontractors and suppliers.

IRON ORE: Expect Record Shipments

Expected to beat all past records . . . Total shipments will be about 129 million tons . . . Hope freeze won't lock Lakes too soon . . . Stockpile state encouraging—*By Bill Taylor.*

Production efforts of the steel industry will not be held down as a result of insufficient supplies of iron ore. Shipments of ore within the United States are expected to break all past records.

Shipments will include ore from Michigan, Minnesota, and Wisconsin, which make up the Lake Superior District, other states, and foreign imports. All told, ore shipments should reach approximately 129,000,000 tons compared with 105,795,865 tons in 1950.

Add Three Ships—Supplying the major portion of the nation's iron ore, companies mining the Lake Superior District have been working at fever pitch to mine iron ore, using better equipment and methods.

The ore carrying fleets serving the iron and steel industry have added three vessels this year to Great Lakes facilities, which have hauled over 70 million tons to date. Three additional carriers are scheduled to be in service before the shipping season ends in late November.

Excellent navigation conditions throughout the spring and summer months have helped. Only an early winter, freezing the Great Lakes too soon, would slow down hauling.

Healthy ore stockpiles at steel mills operated by three of the nation's top producers are cause of optimism. Operators know there is enough ore to last through winter even with expanding capacities. Focus of alarm is on scrap stockpiles, instead. These have not been increased for steelmaking in the cold months.

Meets Demand—Greater rail shipments of ores from Lake Superior ranges to steel centers has kept up with more acute demand. Last year rail shipments totaled around 4 million tons. It is expected that during 1951 better than 7 million tons of ore will have been shipped by rail.

Ores produced in other sections of the country will total approximately 23 million tons in comparison with 15.4 million last year.

(These estimates are based on shipments during the first 7 months of the year.) Imports of foreign ores are expected to be far ahead of last year with increased tonnages from most normal suppliers and additional tonnages from Liberia.

Concern for future supplies of ore has often been voiced. But increased technological research has indicated that it will be many years before our nation's iron ranges will be exhausted. Former estimates have needed continual revision and each new development extends the life of domestic reserves.

In any case steel producers are not waiting for the axe to fall. They are building new mines at Quebec-Labrador, Venezuela, and Liberia.

New Cars to Speed Ore Flow

Greater shipments of Mesabi Range iron ore to Pittsburgh steelmakers will be made possible when the first of 500 new 70-ton ore cars are entered into rail service in April 1951 by the Bessemer & Lake Erie Railroad. Order for the cars was given last week to the Greenville Steel Car Co., Greenville, Pa.

Railroad president Fred W. Okie said railroads must invest in new ore hauling equipment to take care of increasing ore shipments. The new ore cars have a special type door in the bottom and have steam holes in the side so that frozen ore and other heavy raw materials can be thawed out during winter shipments.

ORE PILE . . . ready at Republic.

Great Lakes Icebreaker Proposed

Ore traffic in the Eastern Great Lakes can move a little later in the fall, or a couple of weeks earlier in the spring, when and if the Coast Guard gets a new icebreaker.

Rep. John C. Butler, R., N. Y., has introduced a House bill to authorize the buying or building of an ice cutter to relieve icebound traffic on the lakes. The bill specifies that the vessel be based at the Coast Guard station in Buffalo.

Shallow-Draft—A Coast Guard spokesman said the contemplated icebreaker would be of the *Mackinaw* class. It would be a comparatively shallow-draft vessel, 290 ft long, with a 75-ft beam, and a tonnage of 5252.

Construction of such a cutter, if authorized by Congress, probably would not be completed prior to 1953.

Ky. Coke Put at 1.6 Billion Tons

Over-all known coking coal reserves in Floyd county, Ky., last week were estimated by the Bureau of Mines at more than 1.6 billion short tons.

More than 1.3 billion tons of the total were in beds of 28 in. or more, the Bureau said. Largest reserve bed is the Upper Elkhorn No. 3.

PRESS: Labor Gets Its Story Across

Unions support 800 newspapers . . . Go to members and country's leaders . . . "Steel Labor" is at top, 1 million circulation . . . Gives management line on union trend—*By John Delaney.*

Labor unions in the United States miss few bets in getting their story across in print to their members and the opinion makers and law makers of the country.

A recent estimate gives the circulation of the labor press as between 20 and 30 million. Labor unions support something like 800 newspapers.

Steel Labor, published by the United Steelworkers of America (CIO), is a good example of what Labor is doing to win friends and influence people. It does just what it was created for, reflects the thinking of the USW hierarchy on matters of wages, politics, economics, and working conditions.

Must Reading—Every industrial relations manager in the steel industry worth his salt reads "Steel Labor" regularly to get a line on what the Union is thinking. Often, labor relations men say, they can in this way get an inkling of what the Union will demand in its next contract.

The job of producing and printing *Steel Labor* is "big business." Current circulation is approximately 1,040,000. Cost of production runs to about $260,000 per year. The paper is printed by Cornelius Printing Co., Indianapolis, in five editions: the "regular" or Eastern, the West Coast, the Middle West, the Southern, and the Canadian.

The Eastern edition, circulated to the heavily-populated steelmaking and consuming states of Pennsylvania, Ohio, West Virginia, New Jersey, New York, and New England, accounts for the bulk of the total circulation.

Varying Copy—While so-called "policy" copy is the same in each edition, the various editions carry from four to six, sometimes eight, pages of sectional news. The Canadian edition carries ten pages of sectional news, including 1 to 1½ pages in French. The paper usually runs to 12 pages, carries no advertising.

Nerve center, of course, is Pittsburgh, the international union headquarters. Final say on all copy falls to Vin Sweeney, editor, and director of union publicity, and his staff. Full-time correspondents are located in Los Angeles, Chicago, Atlanta, and Toronto.

Beating Unions to the Punch

"The pedestrian need not wait to be struck before leaping for the curb."

The National Labor Relations Board thus aptly summed up its ruling that when an employer is warned that his plant might be struck without notice he has the right to protect himself by closing down before the walkout actually starts.

The ruling came in a case in which the AFL Machinists Union accused 19 Des Moines automobile dealers of an illegal lockout in violation of the Taft-Hartley law because the dealers shut down in July 1949. The dealers said they wanted to guard against customer's automobiles being marooned in the shops while under repair. Two plants had already been struck.

French Like "Break" Idea

The 15-minute break for a cigaret or coffee which some American plants allow their employees has been approved by both management and labor representatives of the French machine tool industry who have been visting here.

Declaring that it obviously improves efficiency, they will work, on their return to France, to have such a system instituted there.

Throw the Book at Steel Industry?

Judging by Local union sentiment in the Pittsburgh area, the United Steelworkers of America (CIO) will "throw the book" at the steel industry in forthcoming contract negotiations.

First definite hint of what contract demands will be came from USW District 19 and the 10,000-member Local 1397, representing workers at the Homestead plant of U. S. Steel Co.

Both groups agreed that the following demands should be made: (1) A "substantial" wage increase, (2) improved incentive systems, (3) establishment of fair employment practices.

Local 1397 also asked for the guaranteed annual wage, higher premium pay for Saturdays, Sundays and holidays, improved vacation programs, improved safety and health measures, elimination of compulsory overtime work, bigger shift differentials, and speedup of grievance machinery. District 19 also wants improved pension benefits, a lower retirement age, and pension benefits independent of Social Security.

These contract proposals will be submitted to the Union's International Wage-Policy Committee. It will recommend which ones will be included in formal demands.

President Phil Murray of the USW is expected to act soon toward reopening of existing contracts with steel producers. The agreements expire in toto Dec. 31. While changes in the pension system are not negotiable until 1954, it would surprise no one if the union asked the industry to discuss the program beforehand.

STRIKE: Caterpillar, Union Settle

Agree on 13½¢ per hour . . . Workers return, some lost . . . Strike harms production, community, retail stores . . . Work on defense had halted . . . Spare parts hit—*By Gene Beaudet.*

The longest strike in the history of the Caterpillar Tractor Co. ended last week after a 2-month dispute over wages. The settlement announced by the federal mediation service called for a 13½¢-an-hr increase with a cost-of-living adjustment next February.

The 22,000 striking production workers were expected to return to work last Monday after the agreement was submitted for ratification to members at a meeting held over the weekend. Formerly the union had held out for a 19¢-an-hr increase and the company 10¢.

Damage to All—In the wake of the strike were losses to workers, industry, and community.

Shutdown effects have been felt heavily by East Peoria and Peoria. Caterpillar employs one half the industrial workers in the area. Its payroll for its 27,000 employees amounts to $1.6 million per week. With the paychecks of 22,000 of these employees no longer being translated into buying power, retailers in the area had come upon hard times.

Merchants had offered credit until the strike was over. Sales of clothing, shoes, furniture and household items had dropped off and there was little traffic through department stores.

Many other businesses had also slowed down. Rooms for rent have greatly increased as workers from out of the area left for home. It will take time to recover.

Production Losses—During August the company lost $878,407. For the first 7 months of the year sales averaged $37.7 million per month. This means that the loss of equipment to date has come to over $75.5 million, including crawler and wheel-type tractors, industrial and marine diesel engines, bulldozers, scrapers, graders and other items.

Defense production on a $75 million government contract issued since Korea had also been halted.

Caterpillar continued taking all the steel shipments it had coming during the work stoppage. Company officials expect to produce at maximum capacity for the rest of the year without steel difficulties once production resumes. They are still buying a good part of their needs on the foreign and conversion markets.

Spare Parts—Of great concern is the loss of spare parts production. Before the strike, materials shortages prevented maximum production and order backlogs were greatly extended. Now they will be even worse. Dealers have been salvaging all the used parts they could find to keep customers' equipment running.

Parts trading has been common but has slackened off as inventories hit rock bottom on scarce items. Some have taken to having them fabricated on their own, at higher cost, to meet the need.

"Sure—I got the specs . . . Yeah, here they are."

Since assembly lines were formerly working at capacity, no decrease in order backlogs of finished equipment can be hoped for. However, parts production can be boosted over previous levels because of improved inventories. Increased use of subcontractors will also be made.

Another problem puzzling company officials is the number of employees lost by the strike. Just how many more employees have found jobs elsewhere is impossible to estimate but Caterpillar is finding out this week and will probably increase recruiting efforts.

WSB to Hold Labor Talks

The Wage Stabilization Board will begin hearings this week on the contract dispute between the CIO United Auto Workers and more than half of the nation's copper and brass fabricating industry.

Board Chairman Feinsinger telegraphed the union and the 13 large companies involved in the dispute that the panel will hold a preliminary "procedural conference" this Friday.

The union has not published its demands, but is reported to have asked for a fat wage hike, a cost of living escalator clause and an annual productivity pay boost.

Union Turns Tables—Sues Hudson

On several occasions, automotive firms have threatened to or actually filed suit against the UAW-CIO. Last week the union reciprocated. Local 154 has filed suit in Federal Court seeking $500,000 from Hudson Motor Car Co. for alleged breach of contract.

The union argues that in June and July Hudson employees worked so few hours they were exempted from paying union dues. The union is now asking Hudson to pay the dues that would have normally gone into the union treasury.

PIPE: Plating Process Saves Nickel

Uses about one-forty-fifth as much nickel as conventional pipe . . . Plated pipe can be heated, formed or reduced . . . For corrosion resistant applications—*By Bill Packard.*

A new process for plating nickel on seamless steel pipe has been developed by Bart Manufacturing Co., Inc., of Belleville, N. J. The new process, called Lectro-Clad, promises to become a growing factor in applications requiring corrosion-resistant pipe. It is especially significant now because it saves scarce nickel.

The plated pipe requires only about one-forty-fifth as much nickel as conventional corrosion-resistant pipe. It costs about half as much. The pipe used is ordinary seamless steel tubing.

Can Heat or Form—The bond between nickel and steel is permanent, the nickel actually becoming almost an integral part of the steel pipe. The plated pipe can withstand heating, bending, forming and other fabrication processes without damage. It has also been successfully cold-reduced.

Thickness of the plating ranges from 0.007 in. to 0.030 in., depending on severity of corrosion which it must withstand. It is made in standard 20-ft lengths with diameters ranging from 1½ in to 20 in. Diameters less than 1½ in. are achieved by cold reduction. This uniformly reduces the thickness of the plating.

How It's Done—The patented process is relatively simple and fast. Here's how it works: A long nickel anode is inserted and held in the center of the pipe. It is then flooded with a plating solution which has passed through seven tanks to make sure it is absolutely free from impurities. The pipe is rotated while the plating solution is inside. Rotation, plus continuous flow of the plating fluid, prevents formation of gases which might get into the pores of the pipe. It also helps make the plating even.

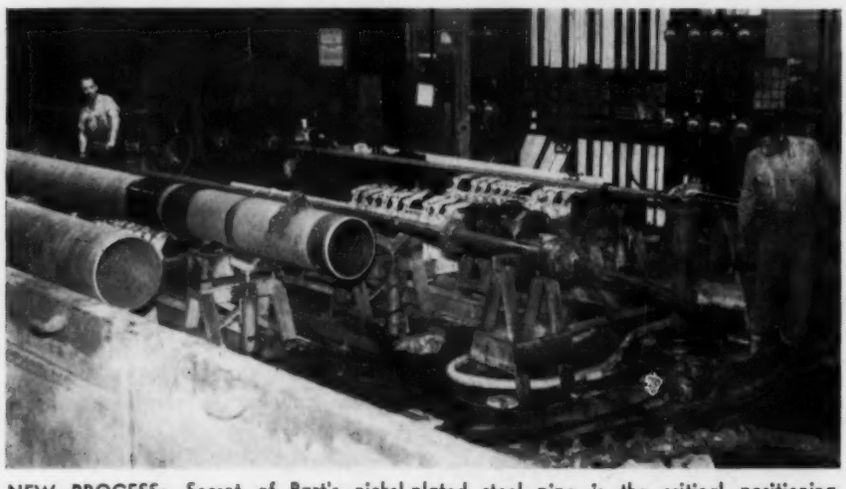
How It Started—The first application of this pipe was installed about 6 years ago in the Oak Ridge plant of the Atomic Energy Commission. AEC needed about 150 miles of pipe which had to be able to withstand highly corrosive conditions. Bart filled the bill. That first pipe is still in use and is said to be holding up well.

Since then the company has expanded its line to include silver and copper plated pipe. It is now experimenting with chrome and lead platings.

Applications—In addition to the AEC job, the pipe has been used for oil well casing and paper and chemical industry applications where corrosion is a problem. It has also been successfully tested in gas distillate and condensate wells.

A chemical company is using it in cooling coils to carry highly corrosive brackish water. In other lines it is used to carry black liquor, caustics, alkalis and hot fatty acids.

Bart believes the pipe will prove useful in other fields.



NEW PROCESS: Secret of Bart's nickel-plated steel pipe is the critical positioning of a very long nickel anode which is threaded through the pipe. Plating solution then floods pipe as it twirls.

Conversion Costs Raise Ceilings

Some of the financial loss sustained by manufacturers in using more conversion steel than in their base period can be made up by newly-authorized higher ceiling prices for products.

Office of Price Stabilization says ceilings now may reflect costs of high-priced steel in partially-finished form. The cost adjustment is permitted by amendments to Ceiling Price Reg. 22, applying to manufacturers as a group, and CPR 30, covering machinery and allied items.

Detroit automakers now rely on conversion sources for about 25 pct of their steel. Other heavy users are makers of household appliances.

Price Limit — These amendments prohibit manufacturers from recording, as conversion steel costs, an amount greater than 200 pct of current mill prices for the same steel. OPS reasons that costs greater than the amount allowed would indicate manufacturers had engaged in "uneconomical transactions."

The OPS action showed recognition that National Production Authority is requiring a number of firms to use the same percentage of conversion steel as in the last half of 1950.

Copper, Zinc:

IMC allots free world supply . . . U. S. gets by far biggest share.

Copper and zinc allocations for the fourth quarter—first in which the free world's supply has been parceled out by international agreement—will mean 333,770 metric tons of copper and 228,460 of zinc for the U. S.

Consequently, this country will receive by far the largest allocations provided for 36 areas stretching from Australia to Sweden. Next in line is the United Kingdom, which will get 91,690 tons of copper and 60,250 of zinc. The total allocation is 677,160 tons of copper and 469,260 tons of zinc.

Arrangements for apportioning the metals were agreed upon by the International Materials Conference's copper-zinc-lead committee. Though representatives of only 12 areas sat on the committee, the group allocated for 24 additional non-communist regions.

Set Tool Needs at $3.7 Billion

Industrial mobilizers in Washington now estimate they'll be in the market for about $2,500,000,000 worth of machine tools to be financed by the military, and another $1,000,000,000 worth to be financed by industry.

Clay P. Bedford, ace troubleshooter for defense mobilizer Charles E. Wilson, is planning to rebuild another $200,000,000 worth, bringing the government's total shopping list to $3,700,000,000 worth of tools.

In 1950, Bedford points out, tool builders turned out about $300,000,000 worth of machinery. He estimates that this year's production will be valued at about $675,000,000, and 1952 production at about $1,300,000,000. By the end of 1952, annual output of the industry should hit the $2,200,000,000-mark, he predicts.

Wilson's office is now negotiating with Italy and Japan for machine tools, Bedford disclosed last week. He says these negotiations are in the preliminary stages at this point. His idea is to have toolbuilders in these two nations contribute "what they can to our machine-tool shortages in the areas in which they have capacity."

Foundries:

Hold Hot Springs meeting . . . Output high . . . Alloy, scrap shortages hit.

America's 250 steel foundries are producing at a rate of 2,200,000 tons yearly as compared with 1,461,667 tons last year, reported F. Kermit Donaldson, executive vice-president, at the annual meeting of the Steel Founders' Society of America. The founders met last week at Hot Springs, Va.

Mr. Donaldson said steel castings are under CMP and almost all production is going to direct military and defense-supporting needs.

With the defense slant on output, steel foundries are feeling shortages of alloying metals and high-grade steel scrap.

Fisher to Build Bullard Lathes

Fisher Body Div. of General Motors will begin building Bullard Cutmaster vertical turret lathes under subcontract to the Bullard Co., Bridgeport, Conn.

Fisher Body's Pittsburgh plant will serve as the assembly point for the Bullard production. Fabrication will take place in Fisher tool room facilities in seven plants in five cities.

Plans call for the maximum production of 50 units a month.

"Schultz!" . . . . . "Yessir?"

State of Industry:

Mobilizer Wilson says nation is near mass output of defense items.

Defense Mobilizer Wilson this week reported the nation is reaching the mass volume stage of defense production and that the pinch on civilian goods would continue until the end of 1952.

However, he said in his third quarterly report, all efforts will be made to continue consumer durables production at the presently permitted 50-60 pct levels.

"Any further heavy cuts would force many plants to close at a time when the military program does not require the plants or manpower," he explained.

Highlights of the report are:

(1) Defense contracts are being placed at a rate of $12,000,000,000 quarterly; deliveries are now at a quarterly rate of $5,000,000,000 and should increase to $10,000,000,000 by September 1952.

(2) Present backlog of machine tool production is 22 months compared with 13 months at peak of World War II; present production rate of $675,000,000 is seen as doubled within a year; bottleneck is being hacked away with priority assistance, a new pricing pattern, and manpower recruiting aid.

(3) About one-third of the $2 billion steel expansion program is complete; mid-year capacity of 104,000,000 tons will be 109,000,000 by January. Expansion is spotty—new ingot and rolling mills 35 pct complete, blast furnace 19 pct, and coking facilities about 25 pct.

(4) Aluminum capacity expansion 14 pct complete. New production of 23,000 tons already in and 100,000 tons nearly ready.

(5) Power program will be pushed. Despite cutbacks in allocations, close to 7 million kw will be added this year.

(6) Salvage programs for steel, aluminum and copper will be pushed. Current scrap drive expected to produce 3,000,000 tons of steel scrap. Farm scrap drive set to begin this month.

LEAD: Will It Come Under CMP?

Demand for CMP control grows . . . Bearing, battery makers warn of shortages . . . Requirements grow, supplies shrink . . . Requests three times present supply; imports reduced.

Inclusion of lead as the fourth controlled material nears as a possibility in view of the increasing shortage. It is already under government allocation.

Such a recommendation has already been put forth by bearing manufacturers. They tell control officials that unless this action is taken, or increased aid is given, a serious bearing shortage threatens.

Battery Shortage — Similar complaints have been received from both industrial and storage battery manufacturers. Makers of industrial batteries say their permitted September use allowed production of only one-third of their orders.

Hope Dim—Meanwhile, Defense Production Administration holds out little hope for any easing of the supply. Pig lead allocations for October will be no more than 25,000 tons. The remaining 3000 tons of the available supply will be held in a reserve pool.

Requirements are increasing while supplies are shrinking, DPA says. Consumption last year amounted to more than 1,200,000 tons against a supply of 1,360,000 tons.

Low Year—This year the supply in sight amounts to little more than 1,000,000 tons—410,000 tons from domestic production, 440,000 from scrap recovery, and 180,000 from imports. Filed requirements are running at three times the available supply.

Reduction in supply is due almost entirely to reduced imports which last year were 537,000 tons. Imports this year are estimated at 180,000 tons—and this amount is due to drop still lower.

MAKING A DEAL: Paul V. Gaughen (left), subcontracting supervisor of Consolidated Vultee, is about to make a "sale" to J. J. Brown (center), president, Western Stamping, Inc., Los Angeles, to turn out magnesium aileron quadrants. Scene is the recent Military Business Opportunity Show in Inglewood, Calif.

Extend Corporate Tax Deadline

Corporations now have until Nov. 15 to file income tax returns for taxable years ending after June 30, 1950, and before Feb. 1, 1951. Legislation authorizing the later deadline for filing was signed into law on Sept. 14.

Extend Bolts, Nuts Order

Termination date of the Office of Price Stabilization regulation applying to price ceilings for bolts and nuts, metallic collapsible tubes, metal wire and cable, and related items has been extended to Dec. 1.

Previously, the close-out date of the law (Supplementary Reg. 12) was Oct. 1. The 2-month extension will permit a manufacturer to continue using the General Ceiling Price Reg. for items covered by SR 12, even though he chooses to use CPR 22 for all other products.

Included in the list of materials still covered by SR 22 are refractories, builders hardware, plumbing and drainage specialties, and watches cased in the U. S. containing imported movements.

Outline Utilities Priority Aid

Requests by electric utilities for controlled materials priority aid must follow procedures outlined in Industry Letter 22 issued by Defense Electric Power Administration.

For other procurement assistance, applications must follow instructions in Order EO-2.

Special assistance requests will be screened tightly, DEPA indicated in warning that utilities must keep close contact with fabricators and mills to see what progress their orders are making.

Industry Controls This Week:

OPS Orders

Supplementary Reg. 12, GCPR—Termination date for bolt and nut manufacturers extended.

Supplementary Reg. 66, GCPR—Allows cement resellers and ready-mixed concrete manufacturers to raise ceilings to reflect higher cement costs.

CPRs 22 and 30, Amend.—Allows manufacturers to raise ceilings to reflect costs of using more conversion steel than in their base period.

CPR 60—Effective date of this metal castings reg. delayed until Oct. 26.

NPA Orders

CMP 1, Dir. 1, Amend.—Permits use of imported steel without deduction from allotments of controlled materials.

M-47B—Allows manufacturers of four groups of consumer durables to shift quarterly allocations from one product to another in the same group.

Cooler Freeze Order Readied

A new order is being drafted by NPA which would limit the types, sizes, grades and finishes of industrial and commercial refrigeration and air conditioning equipment.

Such an order has already been

Turn to Page 189

The Iron Age Defe

TO BUSINESS MEN: This is YOUR Defense Personnel Directory. It will prove invaluable to you in contacting the people in Washington you want to call or visit. If you don't know whom you should contact on a particular problem, you should look under the columns headed Section and Title. We have tried to make this directory as complete as possible by including building and location, room number and phone and extension number for each defense official. In order to help you keep your Defense Personnel Directory up to date for handy reference THE IRON AGE will list changes as they occur. THE IRON AGE wishes to thank the various defense agencies for their cooperation in making this directory possible.

OFFICE OF DEFENSE MOBILIZATION

Executive Office Bldg. EXecutive 3300

Sec. or Div.	Title	Individual	Room	Ext.
	Director	Charles E. Wilson	102	2101
	Asst. to Dir.	Clay Bedford	105½	2116
	Gen. Counsel	Rodolfo Correa	178	2131
Foreign Supply	Asst. to Dir.	William Y. Elliott	164	2243
Production	Asst. to Dir.	Raymond G. Fisher	181	2182
Manpower	Asst. to Dir.	Arthur S. Flemming	187	2223
Stabilization	Asst. to Dir.	A. E. Howse	184	497
Materials	Asst. to Dir.	David D. Irwin	105½	2057
Staff Director	Asst. to Dir.	Charles B. Stauffacher	100½	2131
Science Advsry.	Chairman	Dr. O. E. Buckley	159½	3563
Public Information	Asst. to Dir.	Andrew H. Berding	174½	471
Information	Asst. Dir.	Scott Hershey	174½	494

DEFENSE PRODUCTION ADMINISTRATION

New GAO Bldg. (Except As Noted) STerling 5200

	Administrator	Manly Fleischmann	3R-2	4422
	Gen. Counsel	Charles H. Kendall	4H-16	5121
	Spec. Asst. to Adm.	David W. Hoppock	4A-4	4471
	Manage. Asst.	Russell A. Heddleston	4H-1	3858
	Sec. Con. Off.	Richard W. Lawrence	4I-9	5177
	Admin. Officer	William M. Martin	4I-10	3435
	Staff Asst.	Harry Compton	4A-4	4471
	Info. Off.	Charles Schwarz	3N-1	5803
	Office of Program and Requirements			
	Deputy Admin.	Charles E. Wampler	4G-7	5316
	Asst. to Dep. Adm.	Melvin L. Anshen	4F-7	5313
	Asst. to Dep. Adm.	George N. Lilygren	4E-7	4524
Planning	Director	Glenn E. McLaughlin	4D-7	3148
Program Accounting	Act. Dir.	H. J. Dammeyer	4C-6	5377
Requirements Comm.	Director	R. E. Johnson	4I-7	5313
Military Require.	Director	W. N. Lawrence	4I-9	5425
Foreign Require.	Director	O. R. Johnson	4I-8	5437
Indus. Manpower	Director	Emmett H. Welch	4I-1	5453
Materials Div.	Director	E. H. Merrill	4D-7	4307
Products Div.	Director	Collis Stocking	4I-10	5125
Civilian Require.	Director	John C. Bilby	4I-11	3377
	Office of Resources Expansion			
Resources Expansion	Act. Dep. Admin.	Byron D. Woodside	4K-14	3919

Sec. or Div.	Title	Individual
	Office of Procurement and Production	
	Deputy Admin.	W. W. Watts
	Asst. to Dep. Adm.	A. S. Hawthorn
Defense Mobilization	Coordinator	Eugene F. Bertrand
Critical Areas	Chairman	Ralph Kaul
Small Business Exec.	Chairman	John C. Pritchard
	Office of Staff Service	
	Act. Dep. Admin.	Nathaniel Knowles
	Asst. to Dep. Adm.	M. V. Rosenbloom
Materials Review	Director	John D. Morgan, Jr.
Conservation	Director	Howard Coonley
Reports & Analysis	Director	Nathaniel Knowles
Foreign Activities	Director	Frederick Winant

NATIONAL PRODUCTION AUTHOR

Dept. of Commerce Bldg. (Except As Noted) STerli

Administrator	Manley Fleishmann
Deputy Adm.	Thomas S. Nichols
Ind. Adv. Comm.	G. Lyle Belsey
Appeals Board	T. Munford Boyd
Asst. Adm. for Production Controls	Walter C. Skuce
General Counsel	John H. Hollands
Dir. Comp. Div.	John H. Peckham

METALS AND MINERALS BUREAU

New GAO Bldg. (Except As Noted) STerling

Asst. Adm.	Norman W. Foy

IRON AND STEEL DIV.

New GAO Bldg. STerling 5200

Director	W. B. Quail
Deputy Dir.	Vacant
Ch. Prod. Dir. Comm.	J. F. Smith, Jr.
Ch. Req. Comm.	H. E. Johnson
Production and Distribution Branch	
Alloy Steel	J. J. Boylan
Castings	A. J. McDonald
Cold Drawn Bar	E. C. Loester
Sheet & Strip	M. B. McCafferty
Stainless Steel	J. E. Ewing
Structural Shapes	T. E. Dalby
Tin Plate	F. A. McClelland
Tool Steel	F. Kremp
Tube	J. S. Anderson
Warehouse	R. Link
Wire	N. F. Melville
Forgings	H. F. Weaver
Pipe	C. T. Hapgood
Plate	E. D. Bickford
Metallurgical and Conservation Branch	
Asst. Dir.	E. J. Hergenroether

Defense PERSONNEL

Defense production administration (continued)

Title	Individual	Room	Ext.
e of Procurement and Production			
puty Admin.	W. W. Watts	4B-6	3106
st. to Dep. Adm.	A. S. Hawthorn	4B-6	3106
ordinator	Eugene F. Bertrand	4B-6	3151
airman	Ralph Kaul	4B-4	3738
airman	John C. Pritchard	3310	3561
Office of Staff Service			
t. Dep. Admin.	Nathaniel Knowles	4C-2	3333
st. to Dep. Adm.	M. V. Rosenbloom	4E-1	3333
rector	John D. Morgan, Jr.	4F-1	3223
rector	Howard Coonley	4F-1	3401
rector	Nathaniel Knowles	4C-2	3333
rector	Frederick Winant	4G-1	5333

AL PRODUCTION AUTHORITY

erce Bldg. (Except As Noted) STerling 9200

lministrator	Manley Fleishmann	5800	4461
puty Adm.	Thomas S. Nichols	5100-A	4476
l. Adv. Comm.	G. Lyle Belsey	5212	5511
peals Board	T. Munford Boyd	5805	3820
st. Adm. for Pro-duction Controls	Walter C. Skuce	5009	4111
neral Counsel	John H. Hollands	5120	4331
r. Comp. Div.	John H. Peckham	2051 Temp. Bldg. T	4393

ALS AND MINERALS BUREAU

Bldg. (Except As Noted) STerling 5200

st. Adm.	Norman W. Foy	2D	3351

IRON AND STEEL DIV.

New GAO Bldg. STerling 5200

rector	W. B. Quail	2H-10	3281
puty Dir.	Vacant	2H-8	4346
. Prod. Dir.			
Comm.	J. F. Smith, Jr.	2G-8	5748
. Req. Comm.	H. E. Johnson	2G-1	3510
oduction and Distribution Branch			
ief	J. J. Boylan	2A-5	5705
ief	A. J. McDonald	2D-6	5891
ief	E. C. Loester	2A-6	5949
ief	M. B. McCafferty	2A-1	5991
ief	J. E. Ewing	2A-6	4944
ief	T. E. Dalby	2A-4	4011
ief	F. A. McClelland	2C-6	5008
ief	F. Kremp	2A-6	5916
ief	J. S. Anderson	2D-4	5439
ief	R. Link	2B-6	3050
ief	N. F. Melville	2B-6	3420
ief	H. F. Weaver	2C-6	3004
ief	C. T. Hapgood	2D-4	4038
ief	E. D. Bickford	2D-4	4947
allurgical and Conservation Branch			
sst. Dir.	E. J. Hergenroether	2H-9	4868

Iron and steel div. (continued)

Sec. or Div.	Title	Individual	Roo
	Ferroalloys and Metals Branch		
	Asst. Dir.	J. H. Critchett	2H-
Ferroalloys	Chief	F. F. Franklin	2L-
Nickel	Chief	H. Larsen	2K-
Tungsten & Molybdenum	Chief	S. Schein	2L-
	Facilities and Raw Materials Branch		
	Asst. Dir.	R. J. Wyser	2H-1
MRO	Chief	F. A. Weidman	2K-
Pig Iron	Chief	J. A. Claussen	2M-1
Plant & Facilities	Chief	H. L. Leyda	2M-
Refractories & Fluxes	Chief	Mrs. M. M. Savers	2K-1
Scrap	Chief	M. S. Plant	2M-1

ALUMINUM AND MAGNESIUM DIV.

New GAO Bldg. STerling 5200

	Director	N. H. Bell	2N-
	Deputy Dir.	T. A. Lynch	2N-
	Magnesium Branch		
	Chief	Perry Helser	2L-
Requirements & Distribution	Chief	A. M. Dinkfeld	2M-
Castings	Chief	Dr. Anderson	2K-
	Products Branch		
Ingot & Scrap	Chief	Conral Briel	2I-
Extrusions	Chief	Harold Beebe	2J-
Sheet, Plate & Foil	Chief	Robert Farrell	2J-
Powder	Chief	Charles Luke	2J-
Rob, Bar, Wire & Forgings	Chief	W. V. Gilbert	2J-
Castings	Chief	Lloyd Mapes	2J-
	Requirements and Distribution Branch		
	Chief	Connor Batman	2N-
Air Force	Chief	George Mahoney	2K-
Army	Chief	A. M. Martin	2J-
Navy	Chief	E. W. Digge-LaTouche	2J-
For. Chem. & Rub.	Chief	Richard Taylor	2J-
Indus. & Agri. Equip.	Chief	Lawrence Moyer	2J-
Tex. Leather & Spec.	Chief	J. Medley	2J-
Other Claimant Agencies	Chief	R. Heffernan	2J-
	Program and Statistics Branch		
	Chief	S. M. Blumenreich	2M-
	Conservation and Order Administration Branch		
	Chief	Herbert Cullen	2L-
	Facilities Branch		
	Chief	Harry Scott	2J-
Sheet & Plate	Chief	Baily Byars	2J-
Wire, Rod & Bar	Chief	John Thompson	2J-

COPPER DIV.

New GAO Bldg. STerling 5200

	Director	F. H. Hayes	2H-
	Deputy Dir.	J. W. Mullally	2

TL Directory

	Room	Ext.
	2H-9	4795
	2L-8	3756
	2K-9	4681
	2L-9	4695
	2H-11	3960
	2K-9	4939
	2M-10	3026
	2M-9	3934
ers	2K-10	4017
	2M-10	3782
IV.		
	2N-1	5630
	2N-1	5632
	2L-1	5520
	2M-2	4708-5844
	2K-2	5844
	2I-4	4449
	2J-1	4744
	2J-1	3066
	2J-4	4928
	2J-1	4744
	2J-1	4718
	2N-1	3778
y	2K-1	4736-5036
	2J-1	5550
Touche	2J-1	4742
	2J-1	5550
r	2J-3	5910
	2J-3	4752
	2J-1	3066
ch	2M-1	3597
ranch		
	2L-2	3971
	2J-2	4713-3610
	2J-3	3610-4713
	2J-3	4713-3610
	2H-15	3318
	2H	3275

LOCATION OF BUILDINGS

Dept. of Commerce Bldg.	14th St. & Independence Ave., SW
Dept. of Interior Bldg.	C St. between 18th & 19th St., NW
Executive Office Bldg.	17th St. & Pennsylvania Ave., NW
ICC Bldg.	12th St. & Constitution Ave., NW
New GAO Bldg.	5th & G Sts., NW
Temporary Bldg. E	4th St. & Adams Drive, SW
Temporary Bldg. S	Jefferson Dr. near 6th St., SW

Copper Div. (continued)

Sec. or Div.	Title	Individual	Room	Ext.
		Wire Mill Branch		
	Chief	G. E. Rolston	2H	5924
	Asst. Ch.	M. O. Porter	2H	5428
Allocation	Chief	F. Spitale	2H	4924
Program	Chief	A. H. Gould	2H	5428
Components	Chief	L. W. Eighmy	2H	5076
Production & Facilities	Chief	C. Ange	2H	5463
Warehouse	Chief	W. Dyer	2H	3989
		Brass Mill Branch		
	Chief	Paul B. Andrews	2H	4920
	Asst. Ch.	L. C. Chew	2H	3943
	Asst. Ch.	P. W. Taylor	2H	5403
Allocation	Chief	L. O. Thompson	2H	4925
Production & Scheduling	Chief	W. Ashlock	2H	5973
Facilities & Components	Chief	N. Blakely	2H	4926
Technical	Chief	H. Bedworth	2H	5468
Warehouse	Chief	L. C. Chew	2H	3943
Program	Chief	J. O'Connor	2H	5468
		Foundry Branch		
	Chief	Lt. Com'dr W. A. Meissner, Jr.	2H	5429
		R. Shannon	2H	3970
		R. Varndell	2H	3970
		Copper Raw Materials Branch		
	Chief	M. L. Trilsch	2H	5404
Scrap	Chief	C. F. Williams	2H	5069
	Asst. Program Off.	W. E. Bradford	2H	4614
Conservation	Chief	L. T. Bonner	2H	4607
Statistics & Reports	Chief	G. Haycraft	2H	4724
Orders & Regulations	Chief	H. A. Barron	2H	4923
CMP & Program	Chief	James Forman	2H	4608

TIN, LEAD AND ZINC DIV.

New GAO Bldg. STerling 5200

Lead Branch	Acting Ch.	Arthur J. Cavanaugh	2H-1A	3430-3930
Tin Adjustments		Edward L. Hogan	2F-2	3240
Zinc & Cadmium Adj.		Margaret B. Murphy	2E-2	3015
Lead, Antimony, Bismuth Adj.		Edwina Parkinson	2E-2	5484
Tin	Chief	William L. Raup	2F-1B	3166-7
Program	Chief	Herbert O. Rogers	2G-1A	3198-5436
Zinc	Chief	John Sellon	2G-1B	4022-5087

(Turn Page)

MISCELLANEOUS METALS AND MINERALS DIV.

New GAO Bldg. STerling 5200

Sec. or Div.	Title	Individual	Room	Ext.
	Acting Dir.	H. B. Sharpe	2A-2	5361
Selenium		George C. Branner	2B-2	5079
Asbestos, Fibers, Textiles & Fibrous Glass	Chief	Ray H. Coultrap	2B-2	5079
Asbestos	Chief	Henry H. Crowell	2B-2	5079
Industrial Diamonds	Chief	Marguerite Dotye	2B-2	5079
Mica	Chief	Alexander H. Jeffries	2B-2	5079
General Analyst	Chief	Mrs. Mary Lubig	2B-2	5068
Fluorspar	Chief	Samuel H. Manian	2B-2	5084
Artificial Graphite	Chief	A. B. Oatman	2B-2	5079
Clays	Chief	Donald S. Phelps	2B-2	4927
Asbestos Bldg. Mat.	Chief	Carlton E. Roxborough	2B-2	5079
Natural Graphite	Chief	Valentine C. Smith	2B-2	5079
Program & Statistics	Chief	John E. Steinhauer	2B-2	3091

INDUSTRIAL & AGRICULTURAL EQUIPMENT BUREAU

New GAO Bldg. STerling 5200

	Asst. Administrator	Franz Stone	3-H-16	3391
	Dep. Asst. Adm.	Frank Shields	3-H-16	3392
	Admin. Officer.	Herschel Snead	3-H-9	5136

METALWORKING EQUIPMENT DIV.

New GAO Bldg. STerling 5200

	Director	H. L. Tigges	3-H-14	4687
	Deputy Director	P. L. Houser	3-H-14	5857
	Asst. to Dir.	P. S. Gaston	3-H-13	4629
	Admin. Asst.	W. W. Kennedy	3-J-14	5652
	Product & Distribution Branch			
Order Board	Chief	E. Payson Blanchard	3-J-13	4506
Used & Avail. Tools	Chief	Wm. S. McCormick	3-K-14	4200
	Production Control Branch			
	Chief	Thomas I. Shriver	3-J-13	5708
Field Service	Chief	Joe Willis	3-E-2	4857
Materials & Components	Chief	Joseph Fitzgerald	3-K-16	3262
Pool Order	Chief	Robert M. Husband	3-K-13	5909

INDUSTRIES BRANCH

	Chief	Paul W. Norris	3-J-16	4827
Priorities & Distrib.	Chief	Harry E. F. Hawkins	3-J-14	4370
Diversion & Substitution	Chief	Edgar Grossman	3-K-14	4130
Abrasive Product	Chief	Ralph O. Anderson	3-K-15	4799
Cutting Tool	Chief	W. T. Buchanan	3-K-15	5285
Gages, Precision Measuring Instruments	Chief	Dale Spoor	3-M-16	4814
Foundry Equip. & Sup.	Chief	Francis E. Fisher	3-L-16	4804
Machine Tool Cutting	Chief	W. Kent Mathias	3-K-16	4827
Machine Tool Forming	Chief	Paul W. Norris	3-J-16	4827
Indus. Heating Equip.	Chief	Carl L. Ipsen	3-L-16	4813
Wire Drawing & Rolling Mill Equipment	Chief	J. G. Fitzgerald	3-K-16	3262
Light Power Driven Equipment	Chief	Herbert A. Newman	3-K-16	4802
Machine Tool Attach. & Accessories	Chief	Oscar Iber	3-K-16	4802
Tools, Dies, Jigs Fixtures	Chief	P. R. Marsilius	3-J-16	4801

PROGRAM & REQUIREMENTS BRANCH

CMP	Chief	James Shiels	3-M-14	3978

OFFICE

Te

Sec. or Div.	
	Di
	Tempor
	C
	E
	Di
	Industrial
	Di
	A
	A
	A
	Di
	C
Passenger Car	C
Parts & Accessories	C
Truck & Trailer	C
Aircraft	C
Marine	C
	A
Roofing & Insulation	A
Masonry Materials	C
Hardware & Misc. Prod.	A
Prefab. Structures	C
Mechanical Bldg. Equip.	A
Con. & Dis.	C
	C
Auxiliary Machinery	C
Con., Min. & Quarry. Mchry.	C
Cut. Tools & Indus. Sup.	C
Elec. Mchry. & Power Equip.	C
Farm Mchry. & Equip.	C
Gen. Indus. Mchry.	C
Mchne. Tools (new & used)	C
Mchne. Tools (new & used)	B
Metals Extrac. & Fab. Mchry.	A
Trans., Mat. Handl. & Instr.	C
	C
Iron & Steel Products	C
Copper & Brass	C
Lead, Tin & Zinc	C
Castings & Forgings	C
Light Metals	C
Scrap Iron & Steel	C
Misc. Metals & Minerals	C
Fabricated Products	C

nse Personnel Directory—continued

OFFICE OF PRICE STABILIZATION

Temporary Bldg. E. STerling 4200

	Title	Individual	Room	Ext.
	Director	Michael V. DiSalle	H-383	3215
Temporary Bldg. S				
	Office for Advisory Committees			
	Exec. Asst.	Thomas Klechak	8-309	4318
	Director	Ethel B. Gilbert	8-218	8183
	Industrial Materials and Manufactured Goods Div.			
	Director	Murray D. Smith	2067-S	3132
	Asst. Dir.	John M. Bulkley	2067-S	3133
	Asst. Dir.	Sam M. Ewing	2059-S	4989
	Admin. Off.	William F. Hagan	1053-S	6273
	Div. Econ.	Charles W. Moore	2055-S	5843
	Automotive Branch			
	Chief	W. LeRoy Jordan	1052-S	8884
	Chief	Kirk A. Metzerott	1403-S	8879
ories	Chief	Clarence Brown	1409-S	4938
r	Chief	Vacant		
	Chief	Vacant		
	Chief	Vacant		
	Building Materials Branch			
	Acting Ch.	Walter H. Acheson	2533-S	3502
ation	Acting Ch.	Donald Linville	2538-S	3119
ials	Chief	Vacant		
isc. Prod.	Acting Ch.	J. William Wiley	2538-S	3119
res	Chief	Vacant		
g. Equip.	Acting Ch.	Richard C. Cook	2536-S	3118
	Chief	Thomas G. Letchworth	2540-S	8026
	Machinery Branch			
	Chief	Leslie J. Carson	2526-S	6534
inery	Chief	Warren B. Leland	2506-S	8887
Quarry.				
	Chief	Arthur F. Loder	2518-S	8880
dus. Sup.	Chief	Edward L. Norman	2510-S	8976
Power				
	Chief	Harold M. Jalonack	2520-S	8889
Equip.	Chief	Archie A. Stone	2504-S	2291
ıry.	Chief	William F. Earls	2524-S	5533
new &				
	Chief	Blaine C. Lisk	2508-S	5990
new &				
	Bus. Specialist	Ralph R. Erwin	2508-S	5990
& Fab.				
	Acting Ch.	Alec M. Sheard	2516-S	8886
andl. &				
	Chief	Lawrence W. Wallace	2514-S	3519
	Metals Branch			
	Chief	William Kerber	2503-S	5108
oducts	Chief	Walter H. Dupka	2505-S	4610
	Chief	Arthur F. Norling	2513-S	8095
ıe	Chief	Charles C. Rieth	2505-S	8446
gings	Chief	Edward J. Metzger	2511-S	5228
	Chief	William N. White, Jr.	2517-S	3236
teel	Chief	David C. Holub	2519-S	8236
Minerals	Chief	Joseph C. Twinem	2517-S	8892
lucts	Chief	Howard H. Needham	2509-S	4395

DEFENSE MINERALS ADMINIST

Dept. of Interior Bldg. REpublic 18

Sec. or Div.	Title	Individu
	Act'g Admin.	Wilburn C. S
	Asst. to Admin.	Julian W. Fe
Information	Director (acting)	Allan Sherm
	SUPPLY DIVISION	
	Director	Tom Lyon
	Asst. Director	Arthur B. Pa
Copper	Chief	Justin B. Gov
Light Metals	Chief	Howard L. H
Minor & Rare Metals	Chief	Weston G. Bo
Ferro Alloys	Chief	George B. H
Lead, Zinc	Chief	Thomas P. Bi
Iron Ores	Chief	Paul E. Pens
Industrial Minerals	Chief	James A. Ba
	PRODUCTION EXPANSION DIV.	
	Director	C. O. Mitten
	Sp. Assistant	H. E. Olund
	REQUIREMENTS DIVISION	
	Director	Harold A. M
	Act'g Director	(stationed
		Francis B. Sp
	FOREIGN DIVISION	
	Act'g Director	Elmer W. Pel

DEFENSE TRANSPORT ADMINIST

Interstate Commerce Commission Bldg. RE

	Administrator	James K. Knud
	Dep. Admin.	Homer C. King
	Exec. Asst.	W. S. Rainville
	Gen. Counsel	Francis A. Silv
	Admin. Officer	Clarence Bark
	Info. Officer	B. P. Adams
Equip. & Materials	Director	F. Berkeley Ro
Inland Water Trans.	Director	Paul L. Tietjen
Manpower	Director	Samuel L. New
Port Utilization	Director	Andrew Lane
Railroad Transport	Director	George H. Min
St. & Highway Trans.	Director	Edward T. Hic
Warehousing & Storage	Director	Harold K. Osg
Tax Amortization & Defense Loan	Chief	Robert R. Hend

PETROLEUM ADMIN. FOR DE

Dept. of Interior Bldg. REpublic 18

Inter. Sec. & Petrol. Administrator	Oscar L. Chapm
Deputy Admin.	Bruce K. Brow
Asst. Dep. Admin.	Hugh A. Stew
Domestic Industry Operations	
Asst. Dep. Admin.	Alfred P. Fram
Production Division	
Director	Richard G. La

TRATION

:20

	Room	Ext.
chroeder	4428	4188
iss	4604	3141
tn	2611	3337
	3612	3433
rsons	3616	2981
ven	2612	2574
eckmann	3626	4409
urret	2616	3318
olderer	3624	2376
llings	3620	5226
nnen	1039	2877
r	3538	5273
orf	4640	5371
	4070	5372
ntag		
ith NPA)		
eaker	2465	3038
rson	2643	3455

TRATION

ublic 7500

son	4134	6516
	4134	6403
Jr.	5410	5833
er	5311	5274
r	5108	3513
	1116	6309
bins	4117	2295
	4123	3417
man	4217	4536
	3430	8023
hin	5310	8801
ks, Jr.	4133	2113
od	3430	4447
on	1210	5262

ENSE

0

an	6151	704
	6512	3831
rt	6521	4164-65
	6516	3891-3892
rton	2557	4934-35

Petroleum admin. for defense (continued)

Sec. or Div.	Title	Individual	Room	Ext.
	Natural Gas Production & Refining Division			
	Director	Charles E. Webber	6445	4747-4794
	Refining Division			
	Director	C. Eugene Davis	6459	5343-44
	Supply & Transportation Division			
	Director	George A. Wilson	5251	2797-98
	Materials Division			
	Director	Frank A. Watts	2542	5397
	Operations Service Division			
Trans. Materials	Chief	O. M. McClatchey	1070	5351
Projects	Chief	Lloyd O. Zapp	2023	3426
Program	Director	Cecil L. Burrill	6458	2728-3094
	Gas Operations			
	Asst. Dep. Adm.	Charles P. Rather	6517	5321-22
Gas Facilities	Director	Louis C. Sonnen	6646	3924-3946
Gas Planning		Walter E. Caine	5020	5360-2521

DEFENSE SOLID FUELS ADMINISTRATION

Dept. of Interior Bldg. REpublic 1820

	Administrator	Charles W. Connor	5310	5225
	Dep. Admin.	E. T. Klett	5316	5210
	Dep. Admin.	C. R. Ferguson	5320	5211
	Dep. Admin.	W. F. Hahman	5312	5391
Information	Chief	A. L. Newman	5315	5064
Equip. & Materials	Chief	C. W. Woosley	5214	4437
Industrial Finance	Chief	L. N. Plein	5322	2396
Manpower	Chief	L. M. Morris	5320	5211
Coke	Chief	Geo. P. Wilson, Jr.	5215	3403
Transportation	Chief	W. J. Howard	5211	2073

EMERGENCY PROCUREMENT SERVICE

Seventh and D Streets SW. REpublic 7500

	Commissioner			
	Purchase Div.	A. J. Walsh	7132	2243
	Director (acting)	H. C. Maull, Jr.	3002	2672
	Asst. Dir.	Raymond Eberly	3002	3085
Ferrous Metals	Chief	C. W. Chaffee	3120	5692
Rubber	Director	J. B. Ingle	3110	6178
Research & Develop.	Director	Tom V. Wilder	7008	6356
Storage & Transpor.	Director	J. E. Salisbury	3028	3432
Administrative	Officer	H. C. Cleveland	7124	4691

NATIONAL SECURITY RESOURCES BOARD

Executive Office Bldg. STerling 4700

	Act. Chairman	Jack Gorrie	206	3311
	Spec. Asst.	Robert O. Renville	204	3242
	Spec. Asst.	Tom Yarbrough	305	3245
	Gen. Counsel	James L. Kunen	202	3431
	Program Asst.	Dal Hitchcock	200½	3212
	Econ. Adviser	Oscar Embler	302	3358
Special Security Meas.	Director	Ethan Allen Peyser	216	3325

—Controls—

Continued

issued with respect to the production of jacks. This was then seen as the first of a series of such orders which, officials say, may be necessary to conserve scarce materials.

On Ice—The refrigeration order will not be issued immediately but is being held pending industry approval and a possible worsening of the materials situation.

Another factor in this and other orders is further developments in the aluminum industry. Power shortage in the Northwest indicates that the supply will be reduced by at least one-fourth during first quarter 1952.

Need Finishing Touches on Order

Final amendments still must be made in a proposed specific price regulation applying to products of the screw machine, metal stampings, and mechanical precision springs industries.

As it now stands, the draft ruling exempts small orders from ceiling price regulations. A small order is defined as involving less than $500 worth of stampings, less than $400 of screw machine products, and less than $200 of precision springs.

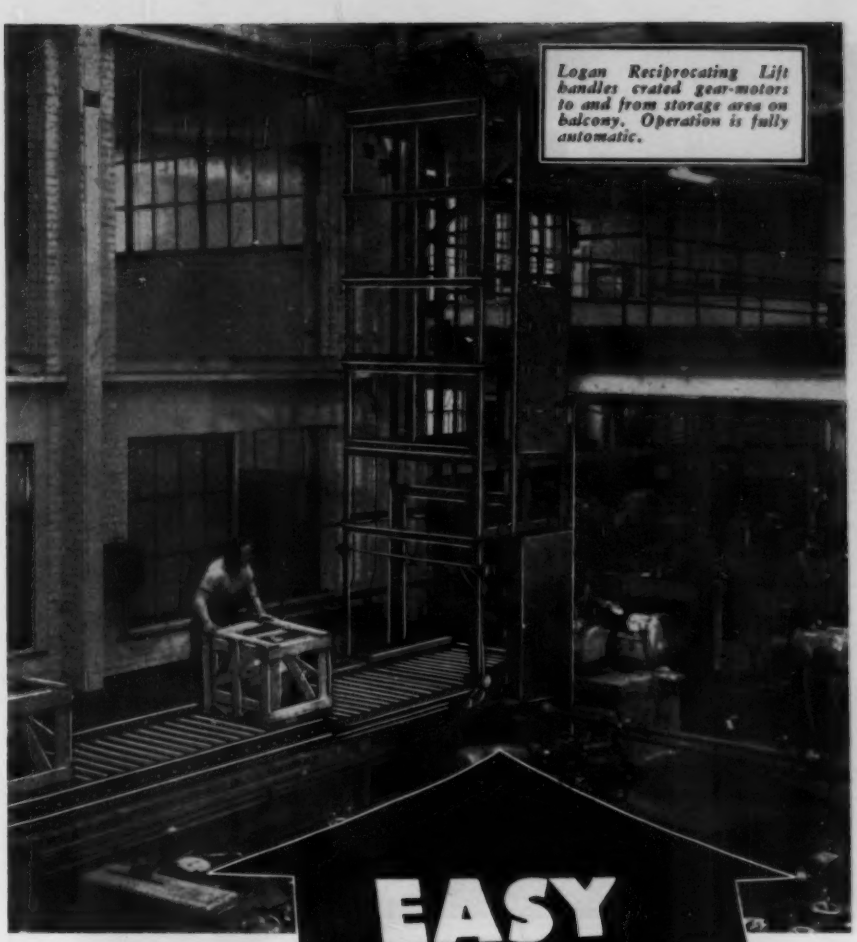
This exemption would be limited to a ratio of small orders to total sales established in a selected month between Nov. 1, 1950, and Jan. 31, 1951.

Costs Can Raise Cement Prices

Cement resellers and ready-mixed concrete manufacturers will be able to use a new Office of Price Stabilization regulation to add higher cement costs to their ceiling prices.

Some concrete resellers, OPS said, had found their gross profit margins reduced 60 to 86 pct because of the higher costs of cement bought from distant points. Supplementary Reg. 66 to GCPR now allows dollars-and-cents cost increases to be added to prices.

Flow of cement to urgently-needed construction may be stimulated by the OPS action. Some spot shortages have been reported hindering industry expansion.


Logan Reciprocating Lift handles crated gear-motors to and from storage area on balcony. Operation is fully automatic.
EASY DOES IT!
EFFORT

Pressing and straining seldom help win an objective. Let Logan Conveyors cancel out the "effort" on your production lines, increase your output, smooth out the busy day for all concerned.

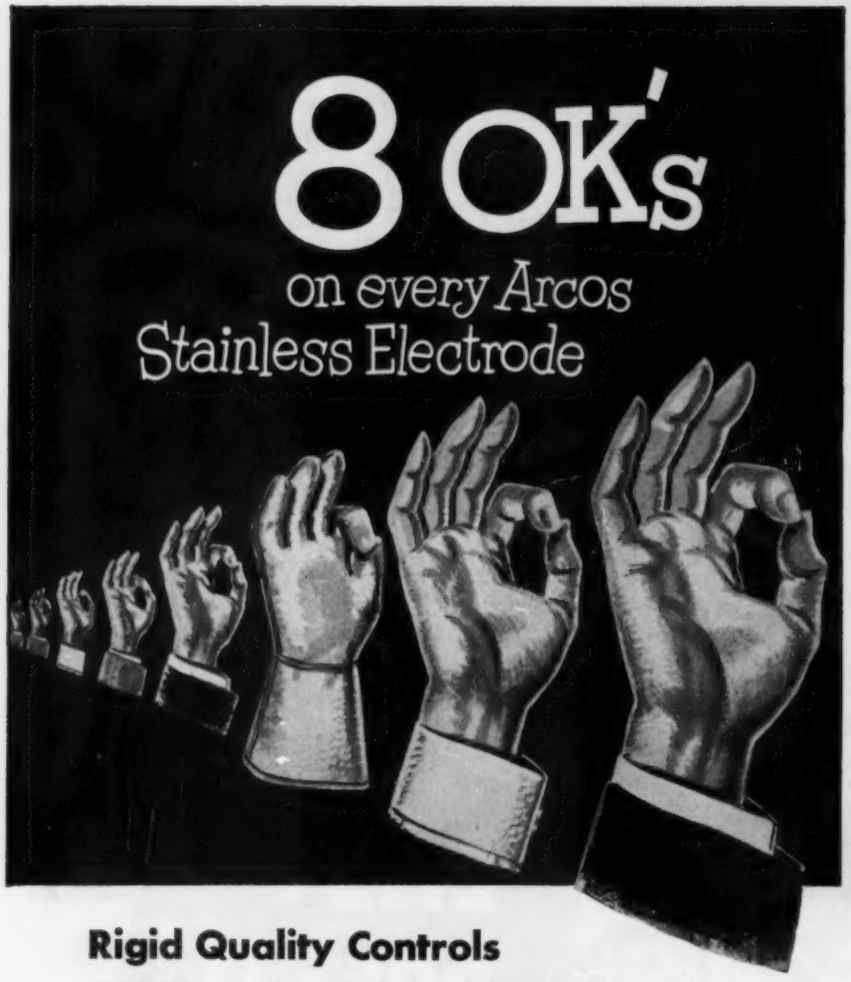
"Effortless" Logan Conveyors (a) keep equipment operating at capacity (b) deliver material to operators at convenient working height (c) save time between processes.

Experience counts, too. Due to two generations of it behind every section of Logan equipment, maximum returns can be expected from skilled planning and engineering. Write today for literature or nearest field engineer to call.

75th ANNIVERSARY 1876-1951

Logan Conveyors

LOGAN CO., 545 CABEL ST., LOUISVILLE, KY.



Rigid Quality Controls
GUARANTEE Better Weld Metal

• There's no room for guesswork in manufacturing Stainless Electrodes that will produce consistently high quality welds on every application. That's why the raw materials that go into Arcos Stainless Electrodes must meet rigid specifications . . . why every electrode must pass so many quality tests before it's put to use. It means complete assurance that the weld metal will be physically, chemically and metallurgically right for the job you want to do.

ARCOS CORPORATION
1500 South 50th Street • Philadelphia 43, Penna.

WELD WITH ARCOS

Specialists in Stainless, Low Hydrogen and Non-Ferrous Electrodes

Finance:

Capital outlay for second half should make 1951 new peak year.

Capital outlays of $13.4 billion in the second half of 1951 will bring the year's totals to a new record high.

Figures compiled jointly by Commerce Dept.'s Office of Business Economics and Securities and Exchange Commission indicate a full-year record of $24.8 billion for plant and equipment expenditures. This is in contrast to $19.2 billion in 1948, previous peak year.

Total manufacturing outlays are expected to reach a new high of $12.8 billion. Other record totals are anticipated for railroads, electric and gas utilities, and mining companies. Railroads plan to spend $1.6 billion this year, almost 40 pct more than in 1950. The mining industry is working on a capital outlay of $870 million.

Limited by Controls — No new marks may be reached by the commercial and miscellaneous industry group, largely because of construction controls. In the second quarter of this year, this group recorded an expenditure of $1.5 billion, but declines are expected in this and the following quarter.

There may be a slight increase in capital outlays for all business from the third to the fourth quarter. However, the surveying agencies warn allocations of steel and nonferrous metals for the fourth quarter may become still more stringent.

Plant construction in the second half year is expected to account for a larger proportion of total capital expenditures.

For all quarters of this year, larger firms are showing greater relative increases in capital outlays than are smaller companies.

C.F.&I. Will Issue New Bonds

Colorado Fuel and Iron Corp. plans to issue $30 million of first mortgage bonds maturing in 21 years and bearing interest at 4¼ pct. They will also issue $10

million of 15-year debentures. Terms and conditions of the new securities will be announced later. Issuance is subject to approval by C.F.&I. stockholders.

Proceeds will be used to build a new seamless pipe mill at Pueblo, Col., and to redeem C.F.&I.'s present first mortgage bonds of which $14,367,500 are currently outstanding.

Jack & Heintz Pay Dividend

Directors of Jack & Heintz, Inc., Cleveland, have authorized payment of $1.50 a share on preferred stock, eliminating arrears.

Manufacturers of electrical rotating equipment for aircraft and fractional horsepower motors, the company accumulated losses from its reorganization in 1946 through 1949 aggregating $8,300,000.

To Build More Aircraft Parts

The American Welding & Mfg. Co., Warren, Ohio, plans to spend in excess of $5,000,000 for additions to plant and equipment.

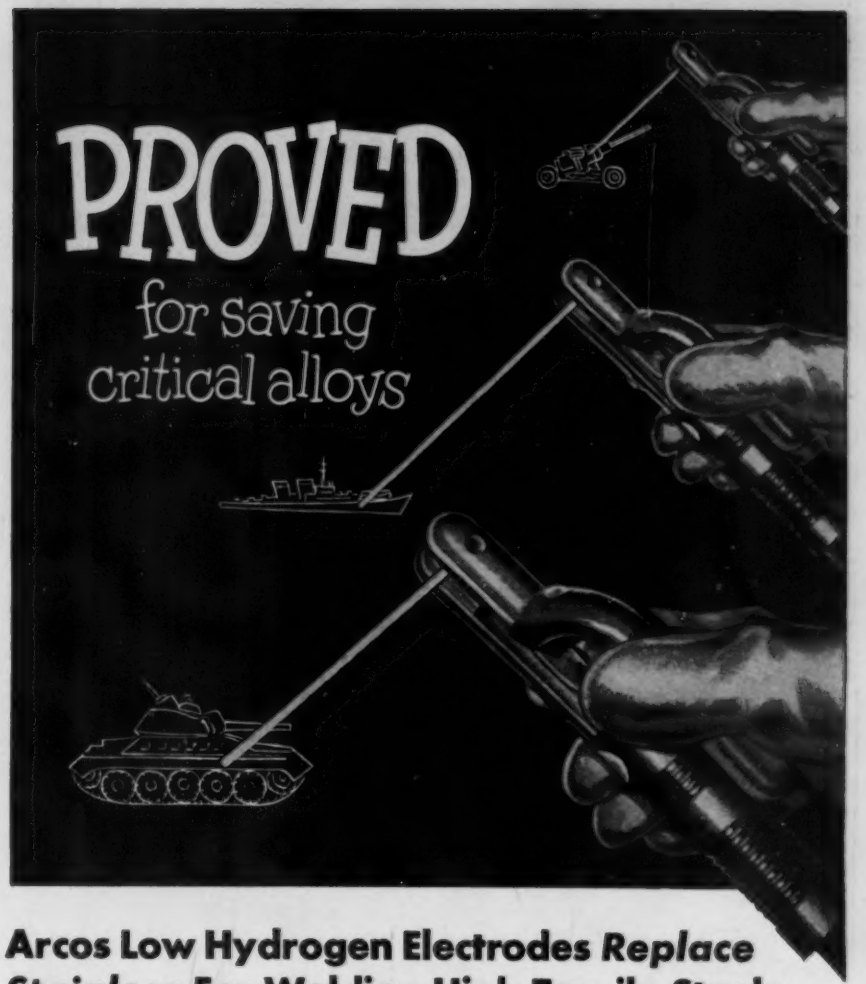
"The expansion," president William J. Sampson, Jr., said, "will permit American Welding to increase substantially its production of urgently needed jet and reciprocating aircraft engine parts."

Purchase of new equipment for the expanded manufacturing facilities of the company will be assisted, Mr. Sampson said, to the extent of $4,160,000 under a Government Facilities contract recently approved. A sizable part of the planned addition, complete with all new facilities, should be in operation soon after the first of next year.

Finances Defense Production

Allis-Chalmers Mfg. Co. has negotiated a $40 million bank loan to finance its increased defense production contracts. Acting as agent for the Army the Federal Reserve Bank of Chicago has guaranteed the notes to the extent of 70 pct.

The company explains that higher defense production has made it necessary to place additional hundreds of subcontract orders.



Arcos Low Hydrogen Electrodes *Replace Stainless* For Welding High Tensile Steels

• Each day sees a growth in the requirements of nickel and chromium for defense production. The increased use of low hydrogen electrodes on welding high tensile steels is helping to free more of these critical alloys.

ARCOS low hydrogen electrodes are far removed from the experimental stage—they've already been "time tested and approved" on armor welding, as well as commercial applications. With them you get trouble-free, uniform welding performance because every one must pass the same rigid quality controls set up for Stainless.

ARCOS CORPORATION
1500 South 50th Street • Philadelphia 43, Penna.

WELD WITH

ARCOS

Specialists in Stainless, Low Hydrogen and Non-Ferrous Electrodes

8 OKs

on every Arcos Stainless Electrode

Rigid Quality Controls GUARANTEE Better Weld Metal

• There's no room for guesswork in manufacturing Stainless Electrodes that will produce consistently high quality welds on every application. That's why the raw materials that go into Arcos Stainless Electrodes must meet rigid specifications . . . why every electrode must pass so many quality tests before it's put to use. It means complete assurance that the weld metal will be physically, chemically and metallurgically right for the job you want to do.

ARCOS CORPORATION

1500 South 50th Street • Philadelphia 43, Penna.

WELD WITH ARCOS

Specialists in Stainless, Low Hydrogen and Non-Ferrous Electrodes

Capital outlay for second half should make 1951 new peak year.

Capital outlays of $13.4 billion in the second half of 1951 will bring the year's totals to a new record high.

Figures compiled jointly by Commerce Dept.'s Office of Business Economics and Securities and Exchange Commission indicate a full-year record of $24.8 billion for plant and equipment expenditures. This is in contrast to $19.2 billion in 1948, previous peak year.

Total manufacturing outlays are expected to reach a new high of $12.8 billion. Other record totals are anticipated for railroads, electric and gas utilities, and mining companies. Railroads plan to spend $1.6 billion this year, almost 40 pct more than in 1950. The mining industry is working on a capital outlay of $870 million.

Limited by Controls — No new marks may be reached by the commercial and miscellaneous industry group, largely because of construction controls. In the second quarter of this year, this group recorded an expenditure of $1.5 billion, but declines are expected in this and the following quarter.

There may be a slight increase in capital outlays for all business from the third to the fourth quarter. However, the surveying agencies warn allocations of steel and nonferrous metals for the fourth quarter may become still more stringent.

Plant construction in the second half year is expected to account for a larger proportion of total capital expenditures.

For all quarters of this year, larger firms are showing greater relative increases in capital outlays than are smaller companies.

C.F.&I. Will Issue New Bonds

Colorado Fuel and Iron Corp. plans to issue $30 million of first mortgage bonds maturing in 21 years and bearing interest at 4¼ pct. They will also issue $10

Terms and conditions of the new securities will be announced later. Issuance is subject to approval by C.F.&I. stockholders.

Proceeds will be used to build a new seamless pipe mill at Pueblo, Col., and to redeem C.F.&I.'s present first mortgage bonds of which $14,367,500 are currently outstanding.

Jack & Heintz Pay Dividend

Directors of Jack & Heintz, Inc., Cleveland, have authorized payment of $1.50 a share on preferred stock, eliminating arrears.

Manufacturers of electrical rotating equipment for aircraft and fractional horsepower motors, the company accumulated losses from its reorganization in 1946 through 1949 aggregating $8,300,000.

To Build More Aircraft Parts

The American Welding & Mfg. Co., Warren, Ohio, plans to spend in excess of $5,000,000 for additions to plant and equipment.

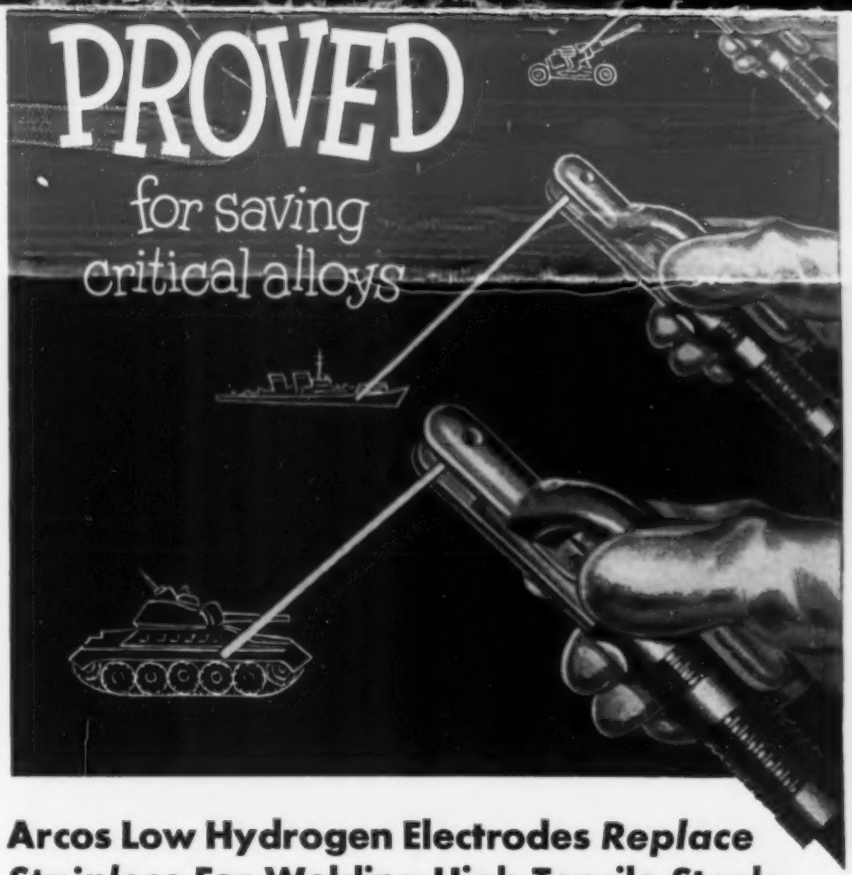
"The expansion," president William J. Sampson, Jr., said, "will permit American Welding to increase substantially its production of urgently needed jet and reciprocating aircraft engine parts."

Purchase of new equipment for the expanded manufacturing facilities of the company will be assisted, Mr. Sampson said, to the extent of $4,160,000 under a Government Facilities contract recently approved. A sizable part of the planned addition, complete with all new facilities, should be in operation soon after the first of next year.

Finances Defense Production

Allis-Chalmers Mfg. Co. has negotiated a $40 million bank loan to finance its increased defense production contracts. Acting as agent for the Army the Federal Reserve Bank of Chicago has guaranteed the notes to the extent of 70 pct.

The company explains that higher defense production has made it necessary to place additional hundreds of subcontract orders.



Arcos Low Hydrogen Electrodes *Replace Stainless* For Welding High Tensile Steels

• Each day sees a growth in the requirements of nickel and chromium for defense production. The increased use of low hydrogen electrodes on welding high tensile steels is helping to free more of these critical alloys.

ARCOS low hydrogen electrodes are far removed from the experimental stage—they've already been "time tested and approved" on armor welding, as well as commercial applications. With them you get trouble-free, uniform welding performance because every one must pass the same rigid quality controls set up for Stainless.

ARCOS CORPORATION

1500 South 50th Street • Philadelphia 43, Penna.

WELD WITH ARCOS

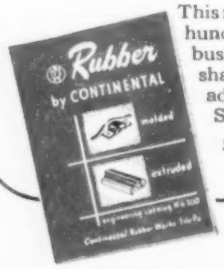
Specialists in Stainless, Low Hydrogen and Non-Ferrous Electrodes

This rubber diaphragm is a vital part of an improved "packless" valve recently developed. It provides an air tight seal for hard-to-hold gases or volatile, corrosive fluids. The diaphragm is strong enough to contain high pressures—yet sufficiently flexible to permit easy valve action.

In addition to heat, chemical, and abrasion resistance, the rubber diaphragms must endure test flexings equal to many years of normal operation.

Continental met—and exceeded—these exacting manufacturing specifications. The solution of this problem typifies the technical service in rubber offered by Continental.

When *you* need better engineered rubber parts, why not enlist the help of specialists?



LET US SEND YOU THIS CATALOG

This new engineering catalog lists hundreds of standard grommets, bushings, rings and extruded shapes. It will be a valuable addition to your working file. Send for your copy today or..

See our Catalog in Sweet's File for Product Designers

MANUFACTURERS SINCE 1903

CONTINENTAL

RUBBER WORKS

1985 LIBERTY BOULEVARD • ERIE 6, PENNSYLVANIA

BRANCHES

Baltimore, Md.	Cleveland, Ohio	Kansas City, Mo.	Pittsburgh, Pa.
Boston, Mass.	Dayton, Ohio	Los Angeles, Calif.	Rochester, N. Y.
Buffalo, N. Y.	Detroit, Mich.	Memphis, Tenn.	St. Louis, Mo.
Chicago, Ill.	Hartford, Conn.	New York, N. Y.	San Francisco, Calif.
Cincinnati, Ohio	Indianapolis, Ind.	Philadelphia, Pa.	Syracuse, N. Y.

—Defense Contracts—

Contracts Reported Last Week

Misc. artillery items—Harvey Whipple, Springfield, Mass.

Telephone—Connecticut Telephone & Elec. Meriden, Conn.

Antenna mast—Modecraft Company, Brooklyn

Mounting—Kings Electronics Co., Tuckahoe, N. Y.

Radio set—Emerson Radio & Phonograph, New York

Radio set—Utility Electronics Corp., East Newark, N. J.

Mounting—Telegraph Apparatus Co., Chicago

Connectors—Arey Machine Co., Hillside, N. J.

Maintenance parts—North American Aviation Inc., Columbus, Ohio

Gages—Link Engineering Co., Detroit

Tank automotive spare parts—Chrysler Corp. Fargo Div., Detroit

Head assy.—McCord Corporation, Detroit

Yoke assy.—Standard Brass Corporation, Belvidere, Ill.

Components of arm assy.—Brad-Foote Gear Wks., Cicero, Ill.

Cupola assy.—DeMattia Machine & Tool Co. Clifton, N. J.

Cover assy.—Honson Mfg Co., Waterloo, Iowa

Door assy.—Rocklin Manufacturing Co., Sioux City, Iowa

Electronic computer — Electronic Computer Corporation, Brooklyn

Machine, sewing—Singer Sewing Machine Company, New York 6.

Radio set—Raytheon Mfg. Company, Waltham, Mass.

Facsimile set—Times Facsimile Corporation, New York

Teletypewriter set—Ralph C. Coxhead Corp. Newark, N. J.

Radiac Detector Charger—Kelley-Koett Instrument Co., Cincinnati

Truck chassis—Highway Trailer Co., Edgerton, Wis.

Pump—Worthington Pump & Machinery Corp. Harrison, N. J.

Spare parts—Scintilla Magneto Div., Sidney, New York

Components of compass system—Dearfott Co. Inc., Little Falls, N. J.

Turbosuperchargers—Hotpoint, Inc., Chicago

Miscellaneous — Canadian Commercial Corp. Montreal

Spare parts—Lockheed Aircraft Corp., Burbank, Cal.

Spare parts—Douglas Aircraft Co., Inc., Santa Monica, Cal.

Holder, primer—Du-Well Metal Products, Inc. Bangor, Mich.

Fuze—Barley-Earhart Corp., Portland, Mich.

Fuze—Lionel Company, New York

M29 burster—National Fireworks Ordnance Corp., West Hanover, Mass.

Adapter, Grenade—Ronson Art Metals Wks. E. Stroudsburg, Pa.

Fuze—Eastman Kodak Co., Rochester 4, N. Y.

Fuze—Precision Castings Co., Inc., Fayetteville, N. Y.

Fin, Shell—Precision Castings Co., Inc., Fayetteville, N. Y.

Case, Cartridge—Revere Copper and Brass Inc., Rome, N. Y.

Winterization Kits—Stewart-Warner Corp., Indianapolis

Booster—Sargent & Co., New Haven, Conn.

Truck—The White Motor Co., Cleveland

Spare parts—R. G. Le Tourneau, Peoria, Ill.

Spare parts—J. D. Adams Mfg. Co., Indianapolis

Spare parts—Harnischfeger Corp., Milwaukee

Spare parts—Klauer Mfg. Co., Dubuque, Iowa

Shackles, spacers and adapters—Graybar Electric Co., Inc., Washington

Utility loader—Evans Products Co., Plymouth, Mich.

I.D. rings—Graybar Electric Co., Inc., Washington

Minesweepers—Berg Shipyard, Blaine, Wash.

Repair parts for Diesel engines—Fairbanks Morse & Co., New York

Electric motors—Norberg Mfg. Co., Milwaukee

Repair parts for Diesel engines—The National Supply Co., Springfield, Ill.

Repair parts for steam engines—Norberg Mfg. Co., Milwaukee

Defense Contracts

Government Inviting Bids

Latest proposed Federal procurements, listed by item, quantity, invitation no. or proposal, and opening date. (Invitations for Bids numbers are followed by "B," requests for proposals or quotations by "Q.")

Spare parts for crane-shovel, 66 itm, CN-52-Q, Oct. 28.

Lathe, 1 ea, 73B, Oct. 8.
Mast base, 250, 10245-14-Q, Oct. 10.
Lampholders, var, 10373-18-Q, Oct. 11.
Cover, panel, var, 10244-14-Q, Oct. 10.
Antenna, antenna section, etc., var, 10252-14-Q, Oct. 11.

Transformers, var, 10647-17-Q, Oct. 10.
Camshafts, var, 10994-29, Oct. 10.
Switches, var, 10285-20, Oct. 10.
Valves, 64970 ea, 72-S, Oct. 15.
Manifold, 224, (DA-ENG—36-058-52-19B), Oct. 22.

Gate valve, 108, 4852-S-B, Oct. 24.
Flooding valve, 114, 4859-S-B, Oct. 31.
Tailshaft, 2, 4869-S-B, Oct. 31.
Dies, washer, grommet, cutter, 1300 st, 4434-B, Oct. 12.

Stud and socket chucks, attaching tool, 13330 ea.

Press, grommet and eyelet, 40 ea.
Indicator, airspeed, 322, 52-5000-Q, Oct. 18.
Mount assy., 1360 ea, 52-202-Q, Oct. 18.
Fittings, 9500 ea, 52-200-B, Oct. 9.
Electrical maintenance supplies, 5 itm, 1481, Oct. 2.

Electrical cable and connectors, 40 itm, 1484, Oct. 3.

Laboratory equipment, 960 itm, 1484, Oct. 1.
Laboratory equipment, 432 itm, 1466, Oct. 1.
Outlet, exhaust, 600, 52-316-B, Nov. 5.
Elbow, 7001, 52-315B.
Cover, engine clutch assy., 275, 52-210B, Oct. 19.

Pedal clutch, 450, 52-210B, Oct. 19.
Facing set engine clutch, 250, 52-210B, Oct. 19.

Yoke clutch release assy., 325, 52-210B, Oct. 19.

Stud, engine clutch housing, 350, 52-210B, Oct. 19.

Cleaner, parts, degreaser, 785, 52-368B, Oct. 22.

Pressure reduction station, 25 ea, (ENG-23-65-52-179B), Oct. 10.

Castings, muzzle brake, 500 to 2000 ea, 22232Q, Oct. 11.

Castings, muzzle brake, 500 to 2000 ea, 22232Q, Oct. 11.

Air conditioner, 10 ea, 216-18-52, Oct. 8.
Bolt, carriage, 30,000, 52-237B, Oct. 17.
Handsaws, 144 ea, LA-INF-17, 9-28.
Hardware & Tools, 2771.64, LA-153-52, 10-8.
Fan, electric, 60 ea, (BO-W-1-34-52), 10-10.
Files, 1048 ea, C-4064-1, 10-8.
Elbows, malleable iron, 1700 ea, C-4064-1, 10-8.

Tees, malleable iron, galv., 600 ea, C-4064-1, 10-8.

Automobiles, 87 ea, 4A-3100-R, 10-18.
Station wagons, 25 ea, 4A-3100-R, 10-18.
Trucks, 18 ea, (ECA-95-820-N-178-2408-1), 10-16.

Jet Helicopter Ordered by Navy

McDonnell Aircraft Corp., St. Louis, will build a jet-powered helicopter to serve the Navy as a short-range cargo aircraft.

A single, 3-bladed rotor driven by small jet engines on the blade tips will propel the 'copter. The plane will have winch equipment and a retractable cargo sling to lift cargo pods.

The ABC of MST

A LWAYS MAKES POSSIBLE
B ETTER PRODUCTS AT LOWER
C OST

A Quality Product

Michigan Electric Resistance WELDED STEEL TUBING

ROUND

3/8" to 4" O. D. 9 to 22 gauge

SQUARE-RECTANGULAR

1/2" to 2" 20 gauge, 1" to 2 3/4", 14, 16, 18 gauge

Carbon 1010 to 1025

Michigan Tubing has uniform strength, weight, ductility, I. D. and O. D., wall thickness, machinability, and weldability. It can be flanged, expanded, tapered, swaged, beaded, upset, flattened, forged, spun closed, fluted, and rolled. Available in a wide range of sizes, shapes and wall thicknesses, prefabricated by Michigan or formed and machined in your own plant.

Consult us for engineering and technical help in the selection of tubing best suited to your needs.

No Job too Tough

No job is too tough for American workmanship. But the demands of the defense emergency have presented many problems in design simplification to reduce costly production delays. Electric resistance welded steel tubing, as manufactured by Michigan, is a simple and economical answer to many such problems.

During World War II we were among the foremost suppliers of tubing for widely different defense uses, such as incendiary bomb casings, jeeps, trucks, and guns. Our manufacturing skill in the production of tubing for these and hundreds of other applications is at your disposal.

No matter what your manufacturing requirements are, for defense or for products used in home, office, or plant, our engineers are ready to suggest design improvements for faster production at less cost by the use of Michigan tubing.

THE OLDEST NAME IN ELECTRIC RESISTANCE WELDED STEEL TUBING

Michigan STEEL TUBE PRODUCTS CO.

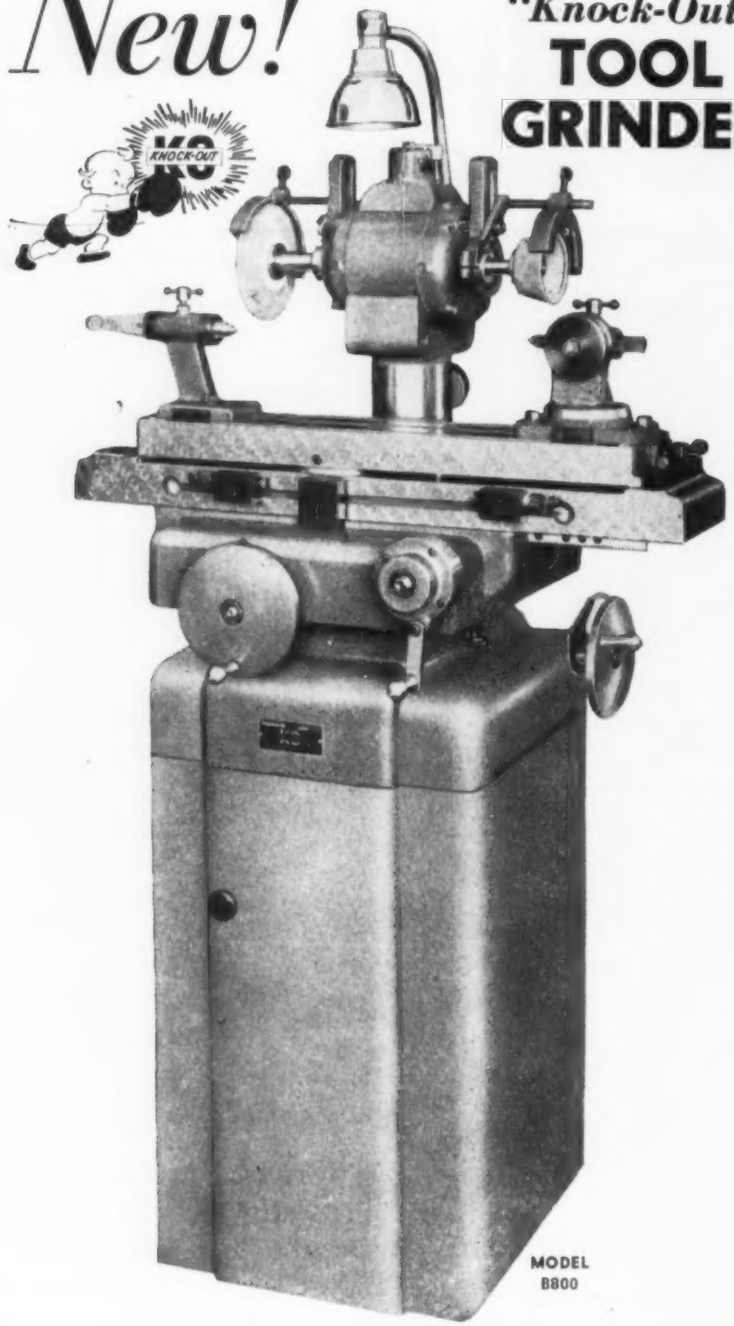
More Than 30 Years in the Business

9450 BUFFALO STREET • DETROIT 12, MICHIGAN

FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland, Dayton, Ohio—Dirks & Company, Portland, Oregon—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—American Tubular & Steel Products Co., Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—Globe Supply Co., Denver, Colorado—W. A. McMichaels Co., Upper Darby, Pa.—A. J. Fitzgibbons Co., Buffalo, N. Y.

New! "Knock-Out" TOOL GRINDER



Precision engineered by practical men who have perfected a Tool Grinder that will cut your set-up time in half!

"The Busiest Machine in the Shop"

See Your Authorized K. O. Lee Distributor
Or write Factory For Complete Literature

DISTRIBUTED ONLY THROUGH FRANCHISE DEALERS

K. O. LEE COMPANY, ABERDEEN, SOUTH DAKOTA

UNIVERSAL TOOL AND CUTTER GRINDERS · CARBIDE TOOL GRINDERS
CHIP BREAKER GRINDERS · ALL GRINDER FIXTURES AND ACCESSORIES
EXPANDING MANDRELS · KEYLESS DRILL CHUCKS · HAND GRINDER SETS

Construction

NEW YORK — August shipments of fabricated structural steel, based on reports received by the American Institute of Steel Construction, totaled 240,072 tons. This figure is only slightly less than the June record of 257,066 tons which represented the largest month since 1930. Shipments for the first eight months of the year have totaled 1,814,116 tons, a gain of 24% over the corresponding period of 1950.

The bookings, or contracts received during August amounted to 211,998 tons, off 5% from July. The 1951 eight months bookings of 2,163,922 tons is however 10% over the same eight months of the previous year.

The backlog (tonnage available for future fabrication) for the next four months only, (to December 31) amounts to 1,184,490 tons, and beyond that period another 1,563,825 tons of work stands on the industry's books, or a potential volume of work ahead of 2,748,315 tons.

Estimated Total Tonnage for the entire industry

CONTRACTS CLOSED Total Tonnage	1951	1950	Avg. 1947/1949
January	361,373	147,275	161,[illegible]
February	256,746	146,695	152,[illegible]
March	297,517	236,111	221,[illegible]
April	337,026	191,183	177,[illegible]
May	268,166	237,476	176,[illegible]
June	207,966	333,000	196,[illegible]
July	223,130*	341,952	229,[illegible]
August	211,998	326,586	212,[illegible]
Totals	2,163,922	1,960,278	1,528,[illegible]
SHIPMENTS			
January	214,000	154,733	166,[illegible]
February	193,638	149,824	161,[illegible]
March	237,087	185,222	191,[illegible]
April	234,095	187,801	192,[illegible]
May	234,486	194,752	198,[illegible]
June	257,066	202,379	192,[illegible]
July	203,672*	165,515	183,[illegible]
August	240,072	218,435	204,[illegible]
Totals	1,814,116	1,458,661	1,491,[illegible]
TONNAGE AVAILABLE FOR FABRICATION			
Within next 4 months (To Dec. 31, 1951)	1,184,490	1,008,518	730,[illegible]
After next 4 months (From Jan. 1, 1952)	1,563,825	617,854	557,[illegible]

*Revised

Inquiries and Awards

Fabricated Steel Awards this week include the following:

8500 **Tons,** Delaware Water Gap, Portland and Milford, Pa., three bridges for Delaware River Joint Toll Bridge Commission, to Bethlehem Steel Co., Bethlehem.

1400 **Tons,** Catasauqua, Pa., Pine St. Bridge across Lehigh River, to Bethlehem Steel Co., Bethlehem.

270 **Tons,** New Haven and East Haven, Conn., grading, drainage and separate structures and approaches, relocation U. S. Route 1. Mariani Construction Co., New Haven, Conn., low bidder.

190 **Tons,** Chester County, Pa., highway bridge for Pennsylvania State Dept. of Highways, to Easton Steel Structures, Easton, Pa.

Fabricated Steel Inquiries this week include the following:

380 **Tons,** Indiana County, Pa., highway bridge on Route LR 68 for Pennsylvania State Dept. of Highways. Bids due Oct. 11.

Reinforcing Bar Awards this week include the following:

190 **Tons,** New Haven and East Haven, Conn., grading, drainage and separate structures and approaches, relocation U. S. route 1. Mariani Construction Co., New Haven, low bidder.

Reinforcing Bar Inquiries this week include the following:

110 **Tons,** Beaver and Lawrence Counties, Pa., seven reinforced concrete structures and one I-beam bridge. Pennsylvania Dept. of Highways, Harrisburg, Pa. Bids due Oct. 11.

Steel Expansion Gets Green Light

Producers given assurances of more structurals . . . Mobilizer Wilson wants growth completed at "earliest possible" date . . . Silences seekers of more expansion—*By George Baker.*

Government officials have given steel producers unofficial but binding assurance that the industry's expansion plans will not be hampered by allocation cuts after Jan. 1, 1952.

Exact amounts of structural steel and metallics to be allocated for the accelerated expansion program have yet to be determined.

Early Completion—But Mobilization Director Charles E. Wilson made it clear to key steel producers here last week that allotments for expansion purposes would be calculated to assure completion of present expansion plans at the "earliest possible" date.

In addition to increased allotments of structurals, the government's neglected steel expansion plans now will allow for priorities assistance in construction of blast furnaces, coke ovens, and other important points of the expansion program.

Seek More Capacity—Present unofficial government goal for the industry is 118,400,000 tons of basic capacity by the end of 1953. Wilson's office admits that it is under considerable pressure from some government circles to raise the target to 125 million tons within this same 2-year period.

But Wilson has thus far silenced these critics with a single question:

"Where are you going to get the raw materials to operate that kind of capacity?"

And where will the steel for extra expansion come from? other officials add.

Possibility of relaxing the Wilson ban on issuance of fast-amortization certificates is predicted as a necessary adjunct of the expansion speed-up.

Defense Needs Higher—Target date for issuance of first quarter controlled materials allocations is now set for Oct. 8.

Officials are unwilling to confirm talk that there will be substantial changes in some fields from fourth quarter allotments. However, it is admitted that defense requirements will be much higher for the quarter.

Record Demand—All requirements had not yet been received and added up last week. But a top official, pointing out the record demand for steel, said that requests for structural steel shapes were then running at 205 pct of supply.

Requirements for steel plate, he said, were then about 180 pct; alloy steels, about 160 pct, and stainless, about 170 pct. It was hinted that construction materials, at least, would get another cut along with some others.

Hearty Appetite—Where's all the steel going, anyway?

This knotty question, propounded by Senator William Knowland, R., Calif., is on Defense Mobilizer Charles Wilson's desk this week.

Knowland says he is amazed at the apparent ability of industry to consume the steel now being produced.

Question of whether government agencies are receiving extra rations of steel also has been put up to Wilson. If this is true, Knowland says, the government must in good conscience cut its requirements to the minimum point consistent with defense needs. This will ease suffering of industry.

Open Books—Business firms holding negotiated contracts with the government will be compelled to throw open their records to federal investigators if legislation now under House consideration becomes law.

General Accounting Office, which has been pushing for enactment of such a bill, claims that many government contractors are "loading" their contracts with non-essential costs. GAO's probe powers are not limited to investigations of contracts in which there is some evidence of fraud.

Bill, which has already passed the Senate, is now awaiting House action. It states that GAO shall have access to, and the right to examine, any pertinent books, documents, or other papers related to any contract which the government may question.

Turn Page

DRIVE SYMBOL: "Scrappy," robotlike mascot of the iron and steel scrap campaign, stands with men of industry and government interested in success of the drive he represents. Left to right are: Robert D. Mossman, Jones & Laughlin advertising manager; Mobilizer Wilson; NPA's Fleischmann; T. S. Repplier, of The Advertising Council.

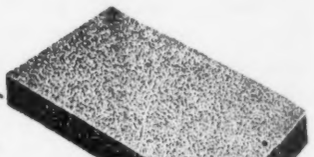
WHEREVER THE HOT STUFF HITS

USE NATIONAL CARBON

TRADE-MARK

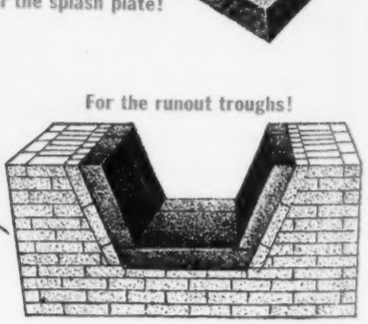
For the cinder notch liner

For the cinder notch plug!



For the splash plate!

For the runout troughs!



For the skimmer plate!

● "National" carbon is now firmly established for blast furnace linings. It is being used outside the furnace as well—wherever there is contact with molten material—for the splash plate, runout troughs—clear down to the ladle—skimmer plate, cinder notch liner and cinder notch plug.

The reasons?

"National" carbon has no melting point. It is highly resistant to slag attack and thermal shock . . . not wet by molten metal . . . has a low thermal expansion . . . and maintains its mechanical strength at elevated temperatures.

Use "National" carbon inside and outside your blast furnaces and you cut down maintenance, speed up production and save money. For more information, write to National Carbon Company, Dept. I.

The term "National" is a registered trade-mark of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street, New York 17, N. Y.

District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

IN CANADA: National Carbon Limited
Montreal, Toronto, Winnipeg

ALUMINUM: Pot Lines Will Stay Put

Mobilizer Wilson sees the light . . . Plants won't be moved to offset Pacific Northwest power shortage . . . Loss of output, costs prohibitive . . . Have alternate plans—*By Karl Rannells.*

Aluminum plants will not be removed from the Pacific Northwest. Instead, programs for increasing capacity there will continue.

These points seem assured this week. If there ever was any serious intention on the part of Defense Mobilizer Wilson to press for transfer of potlines to other regions, it was dropped after conferences between government and industry.

Industry, backed by northwestern congressmen, wants no part of such a migration. It sees the primary problem as a temporary lack of power—a problem which could strike in any other region.

Loss Too Great — Aside from cost of removal, considerably more production would be lost during such a migration than is presently being lost through power shortages.

Estimates as to the cost of removing a potline vary from $4 million to $5 million in a minimum time of 9 months. Equipment shortages would stretch out this time.

So, the unannounced decision seems to be that scheduled power projects will be pushed to completion as soon as possible, and perhaps new ones started. And interim steps will be taken to get through the next 6 months with as little reduction in aluminum output as possible. The aim will be to increase it.

Output Drop—Production officials estimate that the prospective power shortage could cut northwestern production this winter by as much as 200 million lb, roughly one-third of the area's capacity and about 13 pct of the national capacity. (See p. 209.)

Interim measures will be taken promptly. One of these would be a power conservation campaign which will probably involve voluntary brown-out activity by residential consumers.

This could conceivably provide up to 125,000 kw hours. Conservation will be handled by local government power officials who will also set up, in cooperation with industry, an industrial rationing system on a voluntary basis.

Magnesium Shutdown? — Other proposals advanced include a 3-month shut-down of the government's magnesium plant at Spokane. This, it was said, would not seriously affect the defense program. But it would provide an additional 42,000 kw in power.

Another proposal is for temporary diversion of diesel locomotives to be tied in with one or more individual aluminum reduction plants. A battery of 35 such units, costing less than $100,000 to hook up, is estimated as sufficient to operate one potline.

"—'Gentlemen'—That's a falsehood, but put it down anyway."

Decision as to which is more important, aluminum output or the temporary diversion of power from the magnesium plant and diesels from the railroads, lies with Wilson's office.

Shock the Public—It is believed in some quarters that the Wilson telegrams asking for opinions and estimates of plant removal costs had a twofold purpose—to shock the public into a realization of the seriousness of the aluminum and power shortages, and to help build the Interior Dept. case for pushing its power program.

If there is no further delay in completing the present program, power dams are scheduled to add 650,000 kw to the northwest systems next year. Others projected for completion during 1953 may add an additional 1 million kw.

Power from Fuel—Interior Secretary Chapman meanwhile has thrown his support behind a bill, supported on a non-political basis by the area's congressmen, which would authorize spending $60 million immediately for building fuel-burning power plants.

Chapman proposes construction of eight such plants as the quickest solution for tiding over power shortages until planned water power comes into production. The fuel-burning plants would then revert to a standby status.

Dig Down for More Taxes?

Corporations will have to dig down for $2 billion in additional federal taxes if congressional conferees agree to the Senate version of the new revenue bill. Effective date would be Apr. 1.

As it now stands, the bill would raise tax rates to 27 pct on the first $25,000 of earnings and 52 pct, a combined rate, on income greater than that. Excess profits would be subject to an 82 pct tax. Current corporate taxes are 25, 47, and 77 pct. respectively.

The House bill calls for the same combined rate—52 pct—but levies a 30 pct tax on the first $25,000.

Industrial Briefs

Mack Plant Started—Presley L. Lancaster, Jr., deputy director of the Industrial Dispersion Task Force of National Security Resources Board, spoke at the cornerstone laying ceremonies of the Service Parts Div. Building of MACK TRUCKS, INC., Bridgewater Township, N. J. The company was commended for putting into practice dispersion of plant sites.

Application Entered—SUNDSTRAND MACHINE TOOL CO., Rockford, Ill., plans to increase its working capital and provide extra funds for purposes which "may include capital expenditures or plant improvements and additions." The company has applied to the Securities & Exchange Commission for registration of 94,064 shares of common stock.

Commemorates — HENDRICK MFG. CO., Carbondale, Pa., the world's largest manufacturer of perforated metals, is celebrating its 75th anniversary.

Announcement—All business activities formerly conducted under the name of D. B. Engineering Works will be transacted under the new name of BUCCICONI ENGINEERING CO., Gary, Ind. The purpose of the change is to avoid confusion with other firms of similar name.

Come To The Fair—INTERSTATE MACHINERY CO., INC., Chicago, has announced plans for their second annual Machinery Fair and Open House, Wednesday, Nov. 14th through Saturday, Nov. 17th. Everyone concerned with metalworking machinery is welcome.

Moves to New Plant—KIRKHILL RUBBER CO. moved into its modern office and factory in Brea, Calif.

Anniversary—UNITED ENGINEERING & FOUNDRY CO., Pittsburgh, is celebrating its 50th anniversary. To commemorate the year, the company has published a book, "United for 50 years," highlighting the past and spelling out its position in the industry today.

Debit Purchases—The engine stand equipment line of Clayborne Mfg. Co. has been acquired by the CLEVELAND PNEUMATIC TOOL CO., Cleveland. All patent and manufacturing rights are included in the purchase.

Plant Expansion — Contract for a major plant expansion building project which will increase manufacturing floor space at the Dort Highway plant of AC Spark Plug Div., GENERAL MOTORS CORP., by approximately 50 pct, has been awarded to Cunningham & Limp.

Proclamation—Through proclamation the city of Philadelphia will make the month of October INDUSTRIAL SCRAP DRIVE MONTH. The proclamation read by the mayor and addresses by prominent speakers highlighted the opening day ceremonies.

Construction—A $2.5 million plant for BABCOCK & WILCOX CO is under construction at West Point, Miss. The plant which will manufacture steam boiler parts and structural supports, is expected to be completed before the end of the year.

"So you've broken another record at piece work today. You always were a great producer, George."

Open House—Some 5000 members employees' families and townspeo visited the plant of PANGBO CORP., Hagerstown, Md., at its f full scale open house on Sept. 2 special edition of the company's ho magazine helped show visitors h the company engineers and manuf tures its blast cleaning and dust co trol equipment.

West Coast Distributor — Grie Hendry Co., Inc., announces the a pointment of L. H. BUTCHER C San Francisco, Portland, Seattle, a Salt Lake City, as their West Co distributor to the plating and rela metal finishing industries.

Important Change — PETERSO STEELS, INC., moved to larger qua ters and is now located at Springfi Road, Union, N. J.

Atlantic Buys—Purchase of the ca tal stock of Atlantic Steel Boiler C has just been announced by Natio Radiator Co., Philadelphia. The r ganization will operate as the A LANTIC STEEL BOILER CO., IN

Suit Pending—Severance pay amoun ing to $5,927.20 is demanded by f former REPUBLIC STEEL CORP employees in a suit filed in U. S. Di trict Court in Birmingham. The su charges that when the compan Spaulding Mine was closed in 194 the men were cut off the payroll with out receiving severance pay to whic they claim they were entitled.

Gets Contract—Loftus Engineerin Corp., Pittsburgh, has been awarded contract for ten Two-Pit Batteries o Two-Way Top Fired Recuperativ Soaking Pits for U. S. STEEL CORP. at the new Fairless Works, Morris ville, Pa.

Showing at Scovill—"Better by the Mile," a colorful 3-dimensional slide film presentation of the Rossi continu ous-casting method for producing brass bars and billets, will be shown by SCOVILL MFG. CO. at the Na tional Metal Exposition in Detroit Oct. 15-19.

Trucks Need More Steel To Hit Quota

Builders tell NPA can't meet quota of 250,000 vehicles per quarter unless 16,000 tons plate steel allocated . . . Heat treating demand high . . . Machine tool ingenuity—*By Walter Patton.*

The government wants non-military production of trucks kept up to a level of at least 250,000 vehicles per quarter.

Indications are that this target will not be hit unless more controlled materials are made available for truck production. Current outlook for this move is not bright.

Fourth quarter allotments were made on a basis of 256,000 units for the period. But manufacturers told National Production Authority last week that this number would not be turned out unless 16,000 additional tons of plate steel were made available.

Heavy Cuts — Unless they get the additional supplies, they reported, their inventories will be exhausted and fourth quarter production schedules will have to be cut as much as 50 pct in some plants.

NPA points out that the military procurement program is increasing, a strike has reduced copper supplies, and northwest power shortages have reduced aluminum output by at least 15 pct.

Officials look at the reported 160,000 vehicles in dealer inventories and hope for the best as they work on first quarter allocations, due early in October.

Heat Treating Demand—While vehicle production is now off approximately 75,000 units per week compared with the postwar peak, the demand for materials required for heat treating seems to be as insistent as ever. As far as the heat treating supplier industry is concerned, business is excellent.

A reduced automotive load plus a growing defense load has created business volume that is close to the maximum for the postwar period for a number of supplier firms. It is encouraging to note that much of this demand comes from small businesses.

Tool Ingenuity—One of the best indications of the increasing defense momentum is the demonstrated ability of automotive tooling experts to run around machine tool bottlenecks. Reports continue to come in of defense jobs being turned out using antiquated machine tools that would be second or third or fourth choice for the job.

The ingenuity of tool engineers has not only made it possible to adapt ancient equipment to defense applications; in some cases machine tools are being used in ways that did not seem possible.

BELGIAN BILLETS: Steel billets for Studebaker crankshafts, connecting rods, steering knuckles are unloaded at a New York dock. They made a 3000-mile trip aboard the freighter "Axeldyk" from Belgian steelmakers.

Engine Slow-up — Automobile manufacturers have had many severe setbacks in their efforts to tool up for new high compression in-line and V-8 overhead valve engines.

Several engine programs have been slowed down to a point where they seem headed for introduction *after* the defense phase is over. However, no cancellations of machine tool orders have been reported, indicating that hope is not yet dead.

Schools for Skills—The automobile industry may soon be faced with one of the greatest training jobs in its history. The demand for skilled workers has already hit the industry hard. Managers of established plants readily admit they are having much difficulty in keeping skilled help.

The best answer to their problem so far, they readily admit, is to train their own skilled workers. Worker training programs have been stepped up appreciably.

Used Car Strength—While it is impossible to predict the effect of recent increases in automobile prices, it is evident that these price boosts have stiffened the prices of used cars. The second-hand car market took on an optimistic turn immediately following the announcement of an increase in new car prices.

Generally speaking, used car prices have been fairly stable since last May. Inventories of used car lots are also reported in fair condition.

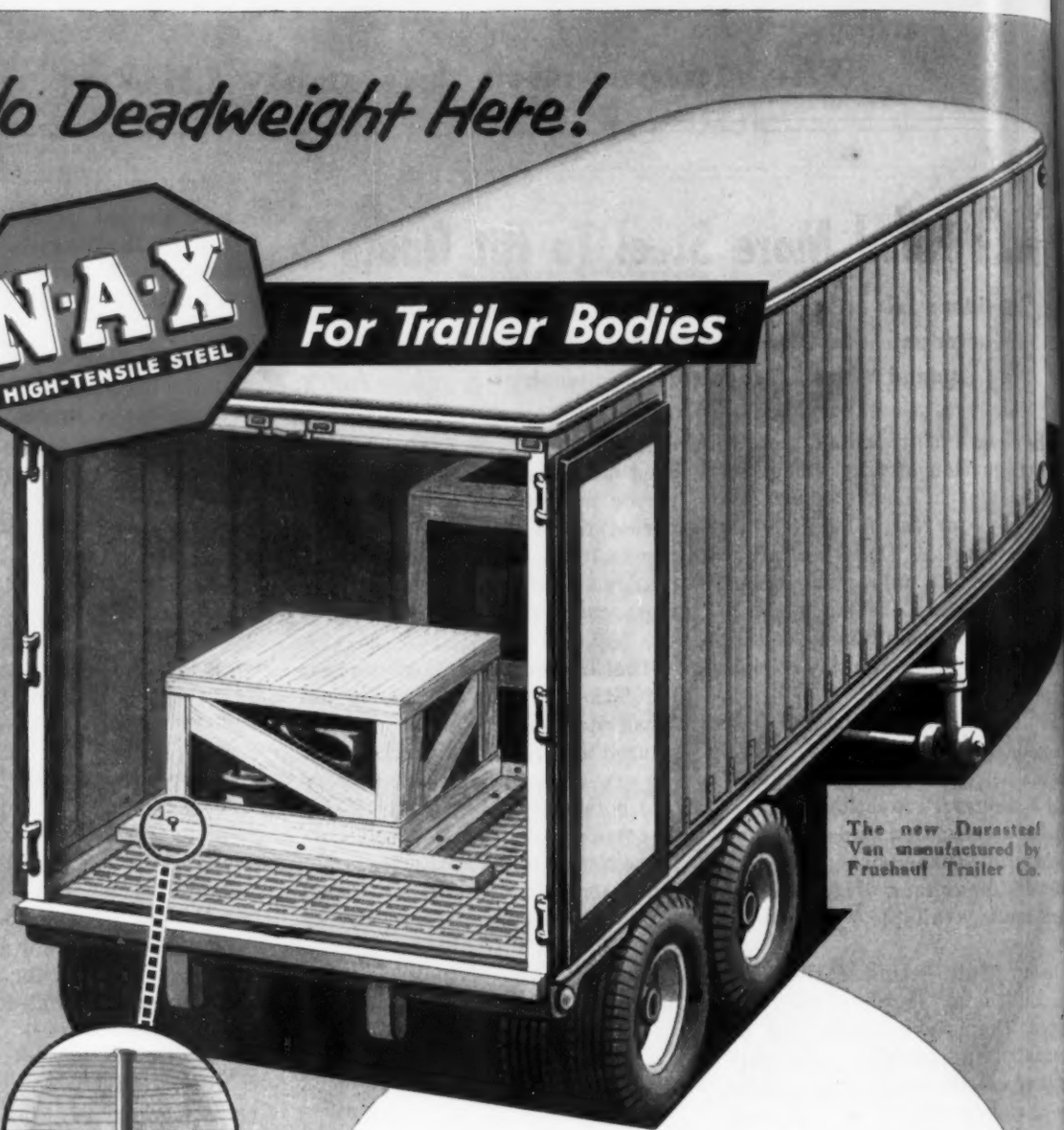
LeSabre Abroad — Harley Earl has sent his fabulous new LeSabre, GM's futuristic experimental motor car, to Europe. The car will be exhibited in Paris and Antwerp.

Turn Page

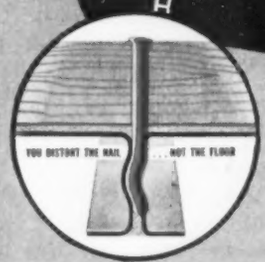
No Deadweight Here!

N-A-X
HIGH-TENSILE STEEL

For Trailer Bodies



The new Duraste! Van manufactured by Fruehauf Trailer Co.



*Great Lakes' Stran-Steel Flooring has high strength and light weight. Its unique nailability permits safe blocking of loads. You distort the nail . . . not the floor.

America's first all-steel trailer body is on the highways—roof, sides, framing and flooring,* all of N-A-X HIGH-TENSILE steel. Years of planning, testing and research went into this unique trailer body, making it the most serviceable ever built.

1. The use of N-A-X HIGH-TENSILE steel in this equipment results in light weight with strength and durability.
2. In addition to greater strength, N-A-X HIGH-TENSILE steel has greater resistance to fatigue, impact, corrosion and abrasion. It offers a greater strength-to-weight ratio with longer life and larger payloads.

More and more of America's highway equipment manufacturers are swinging to N-A-X HIGH-TENSILE steel. Millions of on-the-job miles have proved the superior qualities of this steel . . . have proved its over-all economy.

GREAT LAKES STEEL CORPORATION
N-A-X Alloy Division • Ecorse, Detroit 29, Michigan

It's your SCRAP that makes your STEEL
Keep it moving to your scrap dealer

NATIONAL STEEL CORPORATION

BRAKES: New Treadle Needs Toe-Touch

Bendix power breaking newest development . . . Packard may be first with feature . . . Treadle instead of pedal . . . Takes less time to brake . . . Stress safety features of new system.

Power braking, peppier engines, wer steering seem to be the ree items automobile engineers e most interested in today. Pow- steering has made considerable adway and will probably appear at least three automotive lines ring 1952.

The latest development is power aking. The talk in Detroit is that ckard may feature power brak- g on its 1952 models. General otors is also reported to be inter- ted.

Bendix Products Div. new power aking system eliminates the ake pedal and has instead a con- ol similar to the accelerator eadle. Bendix calls this "Treadle- ac." Another descriptive term sed is "decelerator."

Stress on Safety—Bendix is lay- g great stress on the safety fea- ures of the new design. According its engineers, it is merely nec- ssary to move the foot from the celerator to the "decelerator" by ivoting the foot on the heel. The ovement is said to be accom- lished in one-fourth less time with e usual type of brake control.

Bendix officials say it is possible ow to stop a car traveling at 60 ph in a distance of 5 ft.

The Treadle-Vac includes a pow- cylinder, a piston with a built-in ontrol valve and a hydraulic sec- ion which includes the brake fluid eservoir. The conventional master ylinder in the hydraulic system eliminated.

K-F Stamping Plant Ready Soon

Kaiser-Frazer's new $3 million tamping plant at Shadyside, Ohio, nearing completion. Capacity of e plant is 3000 tons of finished tampings per month. Facilities re available for expansion to 5000 ons per month, according to K-F.

Major equipment consists of 13 large presses ranging from 300 to 750 tons capacity, with die bed areas from 108 to 138 in. Auxiliary equipment includes two 108-in. blanking presses, 12 Warco presses, two 50-ton cranes and one 15-ton crane.

Math Machines:

Detroit takes to electronic brain computers replacing mathematicians.

There are many examples in the auto industry of substituting machine hours for manhours. An interesting recent case is substitution of mechanical brains for trained mathematicians. The electronic brain has already entered automotive engineering for keeps. It is now a question of how fast and how far it will go.

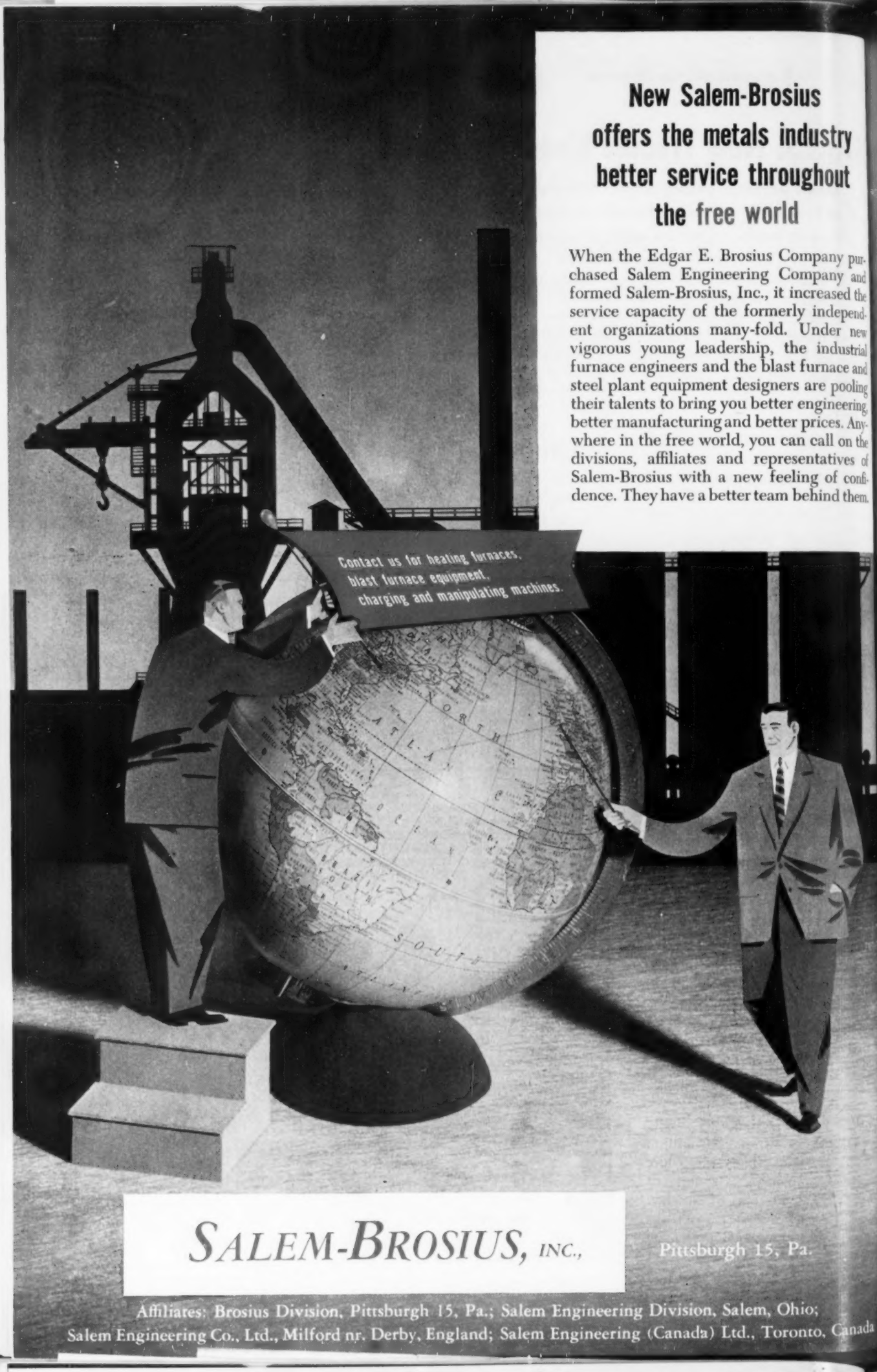
Automobile procedures are putting computers to work in Detroit research laboratories and statistical departments.

Unheard-of Speeds—With the aid of these rapid-fire computers, it is now possible to analyze data and work out involved equations at a rate previously unheard of. An hour's output by these mechanical robots is said to be equivalent to the 10-year output of a trained mathematician.

Future jobs by the new computing machines include studies of strength and durability of materials, recording data developed during engine tests, studying heat flow problems, designing the shape of gear teeth, determining optimum contours and timing of engine cams, working out time-consuming details of new model tooling.

THE BULL OF THE WOODS — By J. R. Williams

THEM TWO RUN TH' BIGGEST LATHE AND PLANER IN TH' SHOP AND ARE LETTIN' ON THEY'RE GOIN' TO TH' BLACKSMITH SHOP TO GET THEIR TOOLS STRAIGHTENED OUT!
TH' GAG IS THAT HE GETS TH' SAME PAY FOR SO LITTLE EFFORT, EH? WELL, YOU CAN BET THEY DID MORE WORK BENDIN' THEM TOOLS FOR A JOKE THAN THEY DO FOR PAY!
10-5
T. M. REG. U. S. PAT. OFF.
THE SISSY
COPR. 1951 BY NEA SERVICE, INC.
J.R.WILLIAMS



New Salem-Brosius offers the metals industry better service throughout the free world

When the Edgar E. Brosius Company purchased Salem Engineering Company and formed Salem-Brosius, Inc., it increased the service capacity of the formerly independent organizations many-fold. Under new vigorous young leadership, the industrial furnace engineers and the blast furnace and steel plant equipment designers are pooling their talents to bring you better engineering, better manufacturing and better prices. Anywhere in the free world, you can call on the divisions, affiliates and representatives of Salem-Brosius with a new feeling of confidence. They have a better team behind them.

SALEM-BROSIUS, INC., Pittsburgh 15, Pa.

Affiliates: Brosius Division, Pittsburgh 15, Pa.; Salem Engineering Division, Salem, Ohio; Salem Engineering Co., Ltd., Milford nr. Derby, England; Salem Engineering (Canada) Ltd., Toronto, Canada

Power Shortage Hits Aluminum

Shutoff cuts production . . . Plant removal doubtful . . . Rush BPA projects . . . Simplot ships iron ore to Japan . . . Pig production at peak . . . Seek Salt Lake sites—*By R. T. Reinhardt.*

Too many eggs in one basket summarizes the aluminum production picture in the Pacific Northwest. The basket is beginning to fall apart at the seams and some of the eggs are getting broken.

Recent curtailment of interruptible power for the light metal producers has cost about 800 tons of metal at the Kaiser Aluminum & Chemical Corp. plant at Mead, Wash., and Alcoa's works at Vancouver. Immediate relief is very doubtful.

Wilson's Plan—In spite of this situation no one in the production picture sees soundness in Charles E. Wilson's query about moving the plants to other areas. Some believe the producers were questioned by the Defense Mobilizer to speed construction of Hungry Horse Dam and other BPA power projects; others think it was a propaganda effort to alert industry and general public to the probability of brownouts. Best thinking is that even though other power curtailments will become effective, aluminum production will not be appreciably further reduced, and plants will not be moved. The situation is making excellent propaganda for those wanting steam plants to meet such emergencies.

Rainmaker—BPA is leaving nothing undone to remedy the emergency, even going to the extent of spending about $60,000 to hire a professional rainmaker to seed clouds over the watersheds which feed its reservoirs.

Other possibilities of relieving the power shortage such as putting through the long proposed tie-line from California to the BPA grid and cutting down on the magnesium production of Pacific Northwest Alloys at Mead, Wash., have little chance of success.

Electric Furnaces—Northwest producers of electric furnace steel had not late last week been affected by power curtailments. It is reasonable to expect that all three Northwest producers—Isaacson Iron Works and Northwest Steel Rolling Mills in Seattle, and Oregon Steel Rolling Mills in Portland—will be hit soon.

Ore News—Simplot Iron Mines, Inc., has made a trial shipment of iron ore to Japan from its deposit 29 miles west of Elko, Nev. President Jack Simplot is leaving soon for the Orient to discuss contracts and terms. He reports the ore to run 56 pct Fe with reserves of at least 30 million tons.

Western Pacific RR. is surveying a line to the deposit but at present ore is trucked 26 miles to rail head at Palisade, Nev. Between 20 and 30 55-ton cars are being shipped daily.

"Dobson, I think you deliberately threw a wrench in the air-conditioning."

Kaiser Steel Corp. is opening up new ore bodies in its Eagle Mountain deposit where rich, but complex, ores have been found by tunneling.

Good Pig News—For the first time in several months pig iron production in the West is at capacity. All three blast furnaces of Geneva Steel Co. in Utah are at capacity along with the lease of Kaiser-Frazer furnace and the old Ironton furnace. Two of Geneva's 1200-tonners have been relined recently, but work on the third is being temporarily delayed.

Plans for Kaiser Steel's third blast furnace are still in the "study" stage but odds are even that it will be built—the questions are: "when and where." Continued scrap tightness and shortage of special foundry grades of pig pressurize the "when."

Site Seekers—Major companies making surveys for plant sites in the Salt Lake City area, with one eye on the labor situation as previously reported, are: Stowe Mfg. Co., which has decided to build a flexible shafting manufacturing plant in the Industrial Center area; Continental Oil Co., said to be interested in sulphuric acid production; E. I. du Pont de Nemours & Co., coal tar products from Geneva Steel and nonferrous smelting plants; and Electromotive Div. of General Motors Corp., considering the area for repair and warehousing of railroad diesel equipment.

No Fouls—Boeing Airplane Co. in Seattle will announce this week the development of an anti-fouling spark plug for planes, automobiles and outboard motors.

Developed by Gil Wright, service engineer, primarily to improve plane engine operation, the plug features a recessed pre-combustion chamber. Boeing is not manufacturing the plug nor has the company stated production plans.

Affiliates: Brosius Division, Pittsburgh 19, Pa.; Salem Engineering Division, Salem, Ohio;
Salem Engineering Co., Ltd., Milford nr. Derby, England; Salem Engineering (Canada) Ltd., Toronto, Canada

You can do 'most any job on a

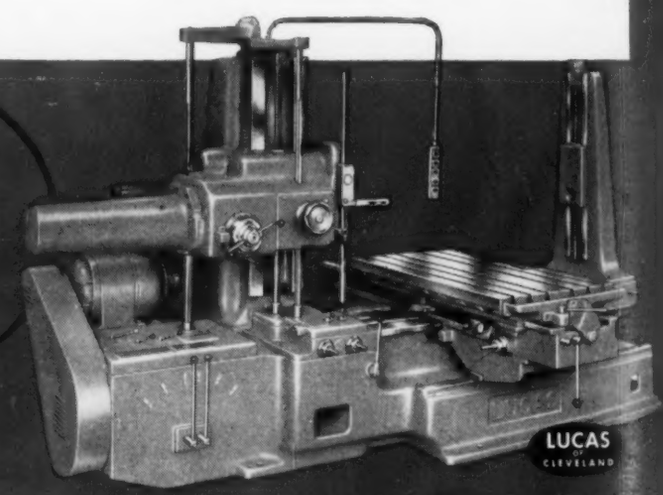
LUCAS

And . . . because you can do such a wide variety of operations on a Horizontal Boring Machine, it is today one of the most CRITICALLY NEEDED machine tools in the entire re-armament program.

The overwhelming demand for the LUCAS Horizontal Boring Machine, which embodies every important design improvement, many exclusive with Lucas, has built up a backlog of priority orders which make short time deliveries difficult.

Therefore . . . in appreciation of your preference for Lucas Machines, we gladly offer our services and suggestions on how better methods and improved operating practices can help you to step-up production on your present Boring Machine equipment until your new LUCAS can be delivered.

Automatic Power Positioning * Integrally cast 4-way beds with 4-point support * Complete range of feeds and speeds to one spindle * Pendant Control * Vibrationless V-belt drive to spindle at high speeds * Complete line of attachments * Chrome plated lead screws



LUCAS *Precision* HORIZONTAL BORING DRILLING AND MILLING MACHINES

LUCAS MACHINE DIVISION, THE NEW BRITAIN MACHINE CO., CLEVELAND 8, O[illegible]

Toolmakers Push Expansion Plans

Industry grows despite talk of risks . . . Some programs listed . . . Handicaps to growth . . . Writeoffs, defense need push some programs . . . Who can use "DX"—*By George Elwers.*

All the talk about how difficult and risky it is from a financial standpoint for machine tool builders to expand their facilities obscures the fact that there actually is quite a substantial expansion going on in the industry.

Within the last few months, for example, the Norton Co. announced plans to up its capacity by more than 60 pct, involving a 6½-acre plant and a new office building for its machine division. National Broach & Machine Co. moved into a new plant. Clearing Machine Co. bought a 100,000 sq ft building.

Monarch Machine Tool Co. neared completion of one plant addition of 40,000 sq ft and started a larger one. Avey Drilling Co. bought a building to be integrated with its present factory. A. H. Frauenthal, Inc., started a plant to manufacture grinders. Oilgear Co., now operating in two buildings, began work on a third.

Still More—The above examples are merely a cross-section of what's going on. They by no means represent all the expansion projects underway, nor even the largest or most important projects. There are many more.

That these expansions are underway, however, does not lessen the fact that the industry can not and will not expand as much as the size of current backlogs might seem to indicate is necessary.

Lesson Learned—First, the industry remembers all too well the abrupt and deep drop in business after the last war. Some war-acquired capacity was sold, then. But most builders hung on and tried to make a go of things by contract manufacturing or by entering new fields such as farm equipment, construction machinery, and packaging machines—anything to keep production facilities operating. Building machine tools is such a boom-and-bust proposition that no one in his right mind would expand madly during a boom without thinking about the bust.

Finances Poor—Second, most machine tool makers have not been in a financial position to expand. Reserves were low before Korea hit. Financing production increases with existing facilities depleted cash and credit. Loans have not been easy to obtain. Only recently have pool order advance payments and government-guaranteed loans come along to ease this problem.

Third, it is folly to build new plants if workers, machines, and materials cannot be obtained for the plant. Much existing machine tool production capacity is not being fully utilized because of materials and labor shortages.

NEW OFFICER: John C. Sears is new executive secretary of the American Gear Manufacturers Assn., succeeding Newbold C. Goin.

Expansion Stimulants—Yet in the face of these difficulties, expansion programs are going on. Most of these are in areas where labor is not critically short. Most are part of normal growth or modernization and would have been built soon anyway, war or no war. In the latter case, defense demand and the attractiveness of getting a fast tax writeoff on part of the new facilities have probably moved up the new building plans a little.

Finally, some firms are not as short of materials as others. None have materials to burn, but many are well off, and can get enough to keep new facilities busy.

Pool Orders—The fact that many Air Force suppliers want to buy T bed lathes, as reported here last week, does not mean that they have ordered anything like the 2000 lathes planned for pool orders.

Indications are that these five companies will share the orders: American Tool, Gisholt, Lodge & Shipley, Monarch, and LeBlond. Some plant expansion will be in order.

Lodge & Shipley, which announced its T lathe last year (The Iron Age, Dec. 14, 1950, p. 104), will expand facilities and speed up subcontracting to fill its "substantial order."

Can't Use "DX"—Contrary to some published and widely-circulated reports, the recently-announced DX priorities are not good for obtaining materials, and they do not constitute a super priority.

DX may be used by machine tool makers only for component parts like bearings or coolant pumps. They cannot be applied to all orders, but are only issued on individual application to the NPA in cases of immediate and extreme emergency.

the magnet that answers THE NEED

Dings New Improved Lifting Magnet . . . Weighs Less, Lifts More, and Lasts Longer

THIS latest Dings magnet has *all* the features necessary for maximum scrap yard performance. A few examples . . .

WELDED STEEL CONSTRUCTION—eliminates the moisture danger, makes a strong rigid magnet that can take the hard blows.

LIGHTER WEIGHT—*More* of the weight your crane is carrying will be payload. A balanced magnetic circuit of advanced design makes this difference.

MAXIMUM POWER, LONGER—No. 1 reason for this is less heat rise due to the improved magnetic circuit. In addition, a new, finer insulating compound dissipates strength-sapping heat, prevents electrical leakage between coil wires.

Those are the *big* new features. There are a dozen other important ones you'll be interested in.

FOR FULL DETAILS, WRITE for the LIFTING MAGNET CATALOG.

DINGS MAGNETIC SEPARATOR CO.

4709 W. Electric Ave., Milwaukee 46, Wis.

Dings *Certified* MAGNETIC STRENGTH

The Iron Age

INTRODUCES

Ray Smith, joined the sales staff of KSM PRODUCTS, INC., Merchantville, N. J., as junior engineer.

Martin L. Killgallon, named plant manager, Berry Div., OLIVER IRON & STEEL CORP., Corinth, Miss. **William N. Boyd** was named superintendent of Div. I and **Walter Most** as acting superintendent of Div. II, in Pittsburgh.

Lierd E. Grant, appointed manager of the Los Angeles Branch of the HOWE SCALE CO. **William J. Tucey** has been appointed assistant branch manager in San Francisco.

Charles A. Reinbolt, Jr., named sales manager of its newly created packaged kitchen division of AMERICAN RADIATOR & STANDARD SANITARY CORP., Pittsburgh.

W. R. Meikle, joined the NATIONAL RADIATOR CO., Johnstown, Pa., and is in charge of heavy steel defense production for the company's steel boiler plant at Middletown, Pa.

Charles Eben Wilson, appointed a West Coast consultant on sales problems for the WORTHINGTON PUMP & MACHINERY CORP., Harrison, N. J. Mr. Wilson retired from the position of sales vice-president.

John C. Ewer, appointed managing director of NORTON GRINDING WHEEL CO., LTD., Welwyn Garden City, Herts, England.

A. G. Ruediger, joined CARRIER CORP., New York, in the capacity of director of procurement.

R. L. Logue, appointed chief body engineer and **D. H. Tillotson** as chief engine and chassis engineer at KAISER-FRAZER CORP., Willow Run, Mich.

W. J. Blackburn, named industrial manager, Denver office of MINNEAPOLIS-HONEYWELL REGULATOR CO., succeeding **Donald W. Larcen,** who was recalled to active military duty. Others appointed: **Donald D. Baker,** Kansas City; **Bernard J. Alberts,** Wichita; **Jack F. Smith,** Tulsa; **Pilgrim McRaven,** Oklahoma City.

Raymond T. Joyce, appointed manager of operations for the BROOKS OIL CO., of Cleveland and Pittsburgh.

Arthur I. Gibson, appointed manager of the newly formed sheet and strip division of the general sales department of U. S. STEEL SUPPLY CO., Chicago.

John D. Harper, named works manager for the Rockdale, Tex., plant of the ALUMINUM CO. OF AMERICA. **Len B. Neubert** has been appointed construction superintendent for erection of the new aluminum smelting plant.

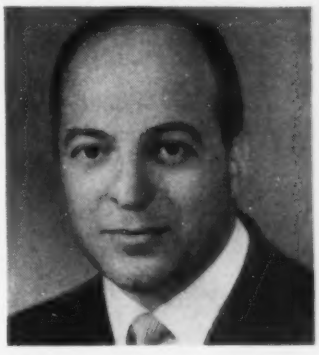
J. W. Goock, appointed assistant plant manager in charge of manufacturing operations in the production of band tools for the DOALL CO., Des Plaines, Ill.

Roy A. Peffers, replaces **H. L. Larrimore** as manager of inside sales for BLISS & LAUGHLIN, INC., Harvey, Ill. Mr. Larrimore has retired after 23 years of service with the company. **John B. Showalter** promoted to assistant manager of inside sales.

Pearce D. Smith, transferred from Pittsburgh to the New York headquarters of the AMERICAN BRAKE SHOE CO. **Arthur N. Dugan,** vice-president of the National Bearing Div. has retired after 37 years.

Turn Page

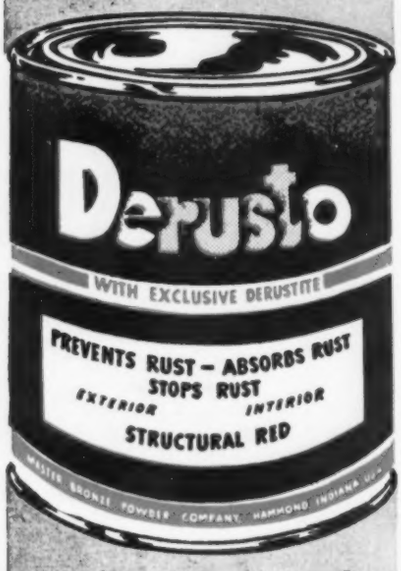
JOEL CLASTER, formerly executive vice-president was elected president of Luria Bros. & Co., Inc., Philadelphia.



RALPH E. ABLON, formerly vice-president was elected to the position of executive vice-president of Luria Bros. & Co., Inc., Philadelphia.

GEORGE E. PARKER, elected as president and chief executive officer of Columbia Steel & Shafting Co., Carnegie, Pa.

For MAXIMUM PROTECTION on all METAL SURFACES...



why **Derusto?**
because **Derusto**

PREVENTS RUST

STOPS RUST

DERUSTO has successfully passed all tests given by the Pittsburgh Testing Laboratory.

DERUSTO comes in standard industrial colors . . . ready for spraying, brushing, or dipping.

● For **FREE SAMPLE** and further information on the Pittsburgh Laboratory tests, write

MASTER BRONZE POWDER COMPANY
5009 CALUMET AVE.
HAMMOND, INDIANA

Personnel

Continued

Harry F. Allen, joined the sales force of HANSON-VAN WINKLE-MUNNING CO., Matawan, N. J. Mr. Allen will make his headquarters in Cleveland.

Chester W. Bruce, named chief engineer, Chicago district, for REPUBLIC STEEL CORP., succeeding **Alvin A. Classen**, who retired recently after 34 years with the company. Mr. Bruce's successor as assistant engineer is **Harold E. Berg**.

R. G. Wheaton, named sales manager for LINE MATERIAL CO., Milwaukee. **R. E. Peterson** replaces Mr. Wheaton as manager, Eastern Sales Div. and **R. O. Farrar** replaces Mr. Peterson in the Philadelphia office.

John F. Spaulding, appointed sales manager of the BLACK & DECKER MFG. CO., Towson, Md.

Edgar F. Kaiser, elected a member of the board of directors of KAISER ALUMINUM & CHEMICAL CORP., Oakland, Calif. **William P. B. Marks** was elected vice-president and secretary.

John A. Maxwell, Jr., and **Clyde Williams**, elected as vice-presidents of TEXAS ENGINEERING & MFG. CO., Dallas. Mr. Maxwell as vice-president in charge of manufacturing and Mr. Williams as vice-president-comptroller. **Latham Leeds** was elected secretary.

Bjarne Klaussen, elected executive vice-president of HOOKER ELECTROCHEMICAL CO., Niagara Falls, N. Y. **Donald E. Springer** has been appointed chief engineer of the company.

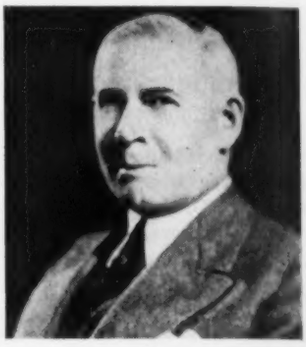
Robert H. Bishop, appointed vice-president in charge of sales of E. F. DREW & CO., New York. Mr. Bishop succeeds **George H. Kent** who has been appointed executive vice-president.

Irving Schomer, promoted to vice-president of the INDEPENDENT SCRAP IRON CORP., Brooklyn.

Joseph H. Gilles, appointed vice-president and general manager, Government and Industrial Div., PHILCO CORP., Philadelphia. **William J. Peltz** was appointed vice-president-operations of the Television and Radio Div.

Raymond E. Zimmerman, appointed chief preparation engineer, coal division of U. S. STEEL CO., Pittsburgh.

E. L. PARKER, resigned as president of Columbia Steel & Shafting Co., Carnegie, Pa., and was elected chairman of the board.



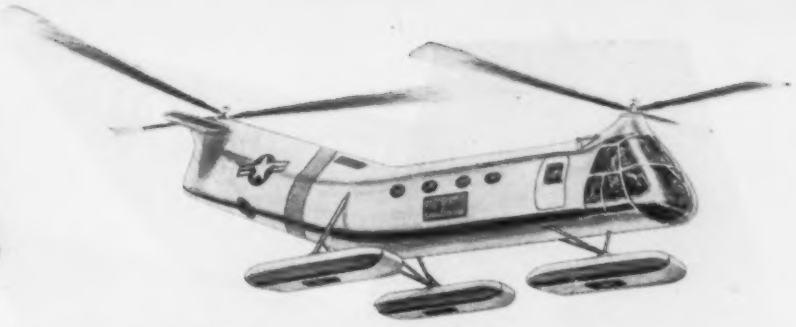
DAVID J. GEMMELL, appointed assistant to the president of National Screw & Mfg. Co., Cleveland.

W. C. LANDIS, appointed general manager of the Air Brake Div., Westinghouse Air Brake Co., Wilmerdling, Pa.

MEL E. MAURER, elected as vice-president in charge of manufacturing for Nesco, Inc., Chicago.

TINNERMAN

Speed Nut® Savings Stories



"Flying Workhorse" picks up 71% assembly savings...73% weight savings

Piasecki Helicopter Corporation uses Tubular SPEED CLIPS® to make spectacular savings over previous method of attaching blanket insulation

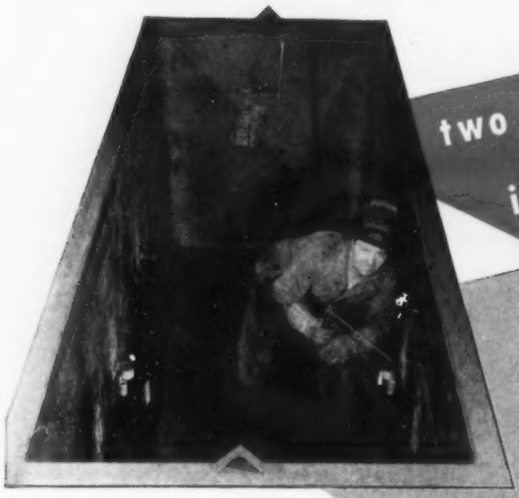
The "flying workhorse" for the Air Force and the Army, Piasecki's new helicopter carries aboard a top-flight example of SPEED NUT savings.

Blanket insulation has to be attached inside the craft in over 700 locations. The old fastening method needed revising to save assembly time and, more important, to save weight. The perfect answer . . . Tubular SPEED CLIPS and standard rivets. *They could take the place of complicated previous methods, and provide an amazing 71% assembly saving, and a total weight savings of 73%!*

Now Tinnerman Tubular Clips, along with hundreds of other SPEED NUTS, are specified for use on all Navy HUP-1 craft and also are used on the new Piasecki H-21 Air Force Assault and Army Transport Helicopter.

With today's production schedules . . . and budgets . . . it's well worthwhile to *"check the Tinnerman line before you design."* Write for more reasons why, presented in new 24-page booklet "A Story of Quality." TINNERMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, Ohio. *In Canada:* Dominion Fasteners Ltd., Hamilton. *In Great Britain:* Simmonds Aerocessories, Ltd., Treforest, Wales.

OLD METHOD
CLIP
RIVET
NUT
WASHER
INSULATION BLANKET
GLOVE FASTENER STUD
GROMMET BUTTON
SPEED CLIP METHOD
TINNERMAN TUBULAR CLIP C 2733
INSULATION BLANKET
CLEARANCE HOLE
STANDARD RIVET
Drawings at left show obvious SPEED CLIP savings. Old method required complicated clip assembly to be riveted to panel. SPEED CLIP needs only clearance hole in existing panel and rivet to provide vibration-proof attachment.
TINNERMAN Speed Nuts®
*Trade Mark Reg. U.S. Pat. Off.
FASTEST THING IN FASTENINGS®



two big names in industry

NEWCOMB-DETROIT COMPANY
as manufacturer

KALAMAZOO STOVE AND FURNACE CO.
as the user

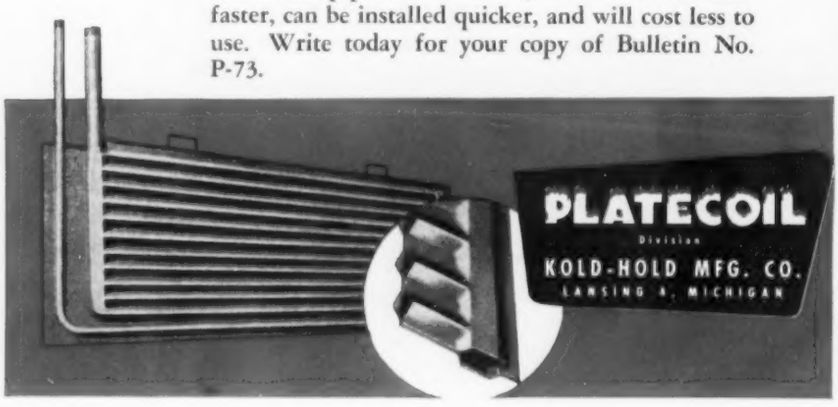
find PLATECOILS more profitable to use

It is less costly to buy and install Platecoils than it is to fabricate pipe coils in their own plant according to Robert Dill, Plant Superintendent of the Newcomb-Detroit Company, Grand Rapids Division. In building the hot rinse tank pictured above they have realized many advantages resulting from the use of Platecoils both for themselves and their customer, Kalamazoo Stove and Furnace Co.

Starting with the original estimate, sales engineers find it much easier to determine the coil size from the convenient Platecoil chart. And Platecoils can be depended upon to deliver the amount of heat specified in their B.T.U. rating. In the construction of the tank, Platecoils are easier to handle and fabrication time and labor are reduced. A Platecoil with the equivalent B.T.U. capacity as pipecoil takes only half the space in the tank thus leaving greater working area. This is important also to Kalamazoo Stove and Furnace Co. as the user.

The extra tank capacity comes in handy in the use of the tank as part of an acid etching system used for pickling aluminum prior to spot welding on aircraft parts. And the higher B.T.U. capacity of the Platecoils provides faster heating and quicker starts.

Wherever pipecoils are used, Platecoils will heat faster, can be installed quicker, and will cost less to use. Write today for your copy of Bulletin No. P-73.



—Personnel—

Continued

Henry Collins, appointed office manager of the new plant in Paducah, Ky., for the ARTHUR COLTON CO. **William C. Goeckel,** was appointed assistant sales manager, SNYDER TOOL & ENGINEERING CO.

M. K. Schnurr, elected a member of the board of directors of ROTARY ELECTRIC STEEL CO., Detroit.

F. C. Anderson, appointed chief engineer of the Edison Storage Battery Div., THOMAS A. EDISON, INC., East Orange, N. J.

John W. Schaffer, promoted to the staff of the general manager of the East Pittsburgh Divisions of WESTINGHOUSE ELECTRIC CORP. Mr. Schaffer's successor as industrial relations manager is **Clark C. Frame.**

D. R. Hulme, appointed purchasing agent for DAVID ROUND & SON, Cleveland.

Robert Wright, promoted to purchasing agent of WATSON-STILLMAN CO., Roselle, N. J. **William Donner,** made assistant buyer; **Paul Andersen,** buyer of finished products; and **Frederick Bradford,** rough materials buyer.

John F. Kurt, promoted to manager of midwest district office of TINNERMAN PRODUCTS, INC., Chicago.

M. B. Atkinson, appointed manager of the Detroit office and **A. W. Maas,** manager of the San Francisco electrical office, of WAGNER ELECTRIC CORP., St. Louis.

J. N. Betz, appointed assistant sales manager in charge of industrial gas sales for the MANUFACTURERS LIGHT & HEAT CO., Pittsburgh.

OBITUARIES

Newlin T. Booth, president of the Deemer Steel Casting Co., New Castle, Del.

C. L. Best, 73, pioneer inventor and tractor builder, at San Francisco. Mr. Best was one of the founders of Caterpillar Tractor Co., he was chairman of the board and a member of the executive committee.

Julius A. Merson, 72, founder of the J. A. Merson Co., Bridgeport, Conn.

Daniel Homer Flonaker, 78, former president and general manager of the National Roll & Foundry Co., Avonmore, Pa.

Gey E. Rogers, manager of standard building sales, Blaw-Knox Div., Blaw-Knox Co., at Dundalk, Md.

METALLURGISTS of Free World to meet in Detroit

The National Metal Exposition, largest show on earth, will open its annual 1-week stand in Detroit, Oct. 13 through Oct. 19 at the Michigan State Fair Grounds. Held simultaneously with the 33rd National Metal Congress and the First World Metallurgical Congress, the 1951 Metal Show is expected to attract about 40,000 metallurgists, engineers, executives and operating men.

Over 200 technical papers will be presented by members of the four sponsoring societies: American Society for Metals; American Welding Society; American Institute of Mining and Metallurgical Engineers, Institute of Metals Div. and the Society of Non-Destructive Testing.

The exhibits and the technical talks are built around the theme of the show "Production For Defense." The latest metalworking machines and methods will be featured in the display booths of about 350 companies engaged in the production, fabrication and treatment of all types of metal and metal parts.

Seminars, symposia and educational lectures will be conducted throughout the week at the technical sessions. The top flight technicians, engineers and scientists in charge of these programs can be expected to put on a technical show equal to that carried on at the exhibit halls of the fair grounds.

For the first time a large select group of metallurgists from abroad will attend the Metal Show. About 1000 of the foremost technicians this side of the Iron Curtain have been brought over by ECA. They are presently touring many industrial and research installations all over the country and will wind up their safari by attending the Metal Show.

ASM EDUCATIONAL LECTURES at the Fair Grounds, Bldg. M

Educational lectures on "Residual Stress Measurements" will be held at the Fair Grounds on Monday and Tuesday, Oct. 15 and 16. Sessions start at 8:00 p.m. each evening. Another series will be held on the "Principles of Heat Treatment" on Tuesday and Wednesday, Oct. 16 and 17. Dr. M. A. Grossman, U. S. Steel Co., will deliver these lectures which are scheduled for 4:30 p.m. each day with one evening session at 8:00 p.m. on Wednesday.

TECHNICAL PROGRAM
Of National Metal Congress

Daily schedules of the technical programs of the four participating societies are correlated here. The ASM will hold its meetings at the Hotel Statler; AWS at the Book-Cadillac Hotel; AIME at the Detroit-Leland Hotel; and sessions of the Society for Non-Destructive Testing at the Detroiter.

Three society banquets are scheduled, AIME Tuesday evening, Oct. 16, at the Leland and ASM Thursday evening, Oct. 18, at the Statler, AWS banquet Oct. 18 at the Book. The seminar—"Dislocation of Metals," AIME, will be held Monday evening; the Adams Lecture, AWS, on Tuesday evening, and the annual meeting of ASM, Campbell Memorial Lecture, Wednesday morning at the Statler.

Monday, Oct. 15

Morning

ASM—CONSTITUTION DIAGRAMS

Constitution and Properties of Cobalt-Iron-Vanadium Alloys—D. L. Martin and A. H. Geisler, General Electric Research Laboratories, Schenectady, N. Y.

Phase Relationships in the Iron-Chromium-Vanadium System—Howard Martens, Research Engineer, and Pol Duwez, Associate Professor of Mechanical Engineering and Chief of Materials Section, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, Calif.

A Partial Titanium-Chromium Phase Diagram and the Crystal Structure of $TiCr_2$—Pol Duwez, Associate Professor of Mechanical Engineering and Chief of Materials Section, and Jack L. Taylor, Research Engineer, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, Calif.

The Titanium-Silicon System—M. Hansen, Supervisor, and H. D. Kessler and D. J. McPherson, Research Metallurgists, Nonferrous Metals Research, Armour Research Foundation, Chicago.

The Indium-Antimony System—T. S. Liu, Teaching Fellow, and E. A. Peretti, Professor of Metallurgy, University of Notre Dame, Notre Dame, Ind.

ASM—MELTING AND REFINING

A Proposed Steel Making Process—A. Reggiore, Milan, Italy.

A New Process for Direct Reduction of Iron Pyrites—A. Scortecci, Genoa, Italy.

A Rapid Analytical Method for Hydrogen in Steel—Y. Ishihara and S. Sawa, Kamakura, Japan.

Basic Bessemer Steel With Low Nitrogen and Phosphorus—P. Coheur, Liege, Belgium.

Phosphorus Deoxidation of Molten Copper—W. A. Baker, Surrey, England.

AWS—STRUCTURAL WELDING

Yield Strength of Welded Continuous Beams—C. H. Yang and L. S. Beedle, Lehigh University, Fritz Engineering Lab., and H. G. Johnston, University of Michigan.

Column Strength Under Combined Bending and Thrust—R. L. Ketter and L. S. Beedle, Lehigh University, Fritz Engineering Lab., and B. G. Johnston, University of Michigan.

Estimating Weldments and Welded Structural Steel—Chas. F. Frantz, Lehigh Structural Steel Co.

Surface Conditioning of Structural Steel by Welding—R. E. Somers and H. C. VonBlohn, Bethlehem Steel Co.

AWS—RESISTANCE WELDING

Physical and Metallurgical Characteristics of Spot Welding Titanium—M. L. Begeman, J. C. Fontana and Frank W. McBee, Jr., the University of Texas.

The Application of Spot and Seam Welding to Design—S. P. Jenkins and Thomas E. Piper, Northrup Aircraft, Inc.

Spot and Projection Welding Using Magnetic Electrode Force—William E. Klingeman and H. H. Kruer, Precision Welder and Machine Co.

A Case of Power—Myron Zucker, Myron Zucker Engineering Co., Jerry Geralds, Midwest Wire Products Co., and Paul Duker, The Detroit Edison Co.

SNT

Ultrasonic Methods of Testing Various Engineering Materials (Including recent developments in equipment and technique.)

AIME—GRAIN GROWTH AND RECRYSTALLIZATION

Grain Structure of Aluminum Killed Low Carbon Steel—R. L. Solterand, C. W. Beattie, Armco Steel Corporation.

Theory of Grain Boundary Migration Rates—D. Turnbull, General Electric Co.

Secondary Recrystallization in Copper Wire—G. Bassi, A. B. Svenska Metallverken, Sweden.

Cleavage and Polygonization of Molybdenum Single Crystals—N. K. Chen and R. Maddin, Johns Hopkins University.

AIME—ALLOY SYSTEMS—I

Systems Titanium-Molybdenum and Titanium-Columbium—M. Hansen, H. D. Kessler and D. J. McPherson, Armour Research Foundation, and E. L. Kamen, U. S. Naval Reserve.

Crystal Structure of Ti_5Si_3, Ti_5Ge_3 and Ti_5Sn_3—P. Pietrokowski and Pol Duwez, California Institute of Technology.

Solidification of Lead-Tin Alloy Droplets—J. H. Hollomon and D. Turnbull, General Electric Company.

Equilibrium Relations in Magne-

Turn to Page 330

British report on all-basic OPENHEARTHS

reported by
Max Davies
British Iron & Steel Research Assn.
London, England

Six furnaces in the United Kingdom and Holland have completed five campaigns. Indicated advantages include: increased output, reduced man-hours for brick laying, less slag bulk, reduction in shutdown time and the most advantageous use of liquid fuels. Built-in pressure indicators help with design and construction.

Results obtained from British and Dutch all-basic openhearth furnaces have aroused considerable interest among steelmakers. These six furnaces are of various types of construction. Four were built and operated in the United Kingdom and two in Holland during the last 4 years. Table I summarizes the five campaigns completed and one still in progress in these six units.

The chrome-magnesite bricks made in Great Britain now equal and surpass the pre-World War II European bricks that then set the highest standard. Table II shows the results of comparative tests with modern bricks from 3 manufacturers: continental pre-war, fired chrome-magnesite bricks; and typical openhearth silica bricks.

In the trial furnaces a number of basic refractories have been tried, including high-purity, fused magnesite. So far, however, the 70-30 chrome-magnesite brick, with the chrome ore as the coarse fraction and the magnesite as the fines, formed under high pressure and fired to at least 2732°F, has proved the best. Turkish chrome has so far been used, but specifications are now in existence both for the chrome ore and for the low-lime magnesite, either natural or from sea-water. There is no reason to believe that chrome ores from other localities will not be satisfactory.

In the early days there was some prejudice against using sea-water magnesia for first quality refractories. The lime content was higher than that obtained from the best natural magnesite deposits. Today, sea-water magnesia is being consistently manufactured with a lime content of 2.5 pct, which compares very favorably with that from other sources.

Much has been learned and much remains to be learned about basic refractories. Both extensive laboratory work and observation makes it clear that bursting expansion resulting from

TABLE I

CAMPAIGN RECORDS FROM SIX FURNACES

	Type	Tapping capacity, tons	Fuel	Average Performance			Average Time			Roof Life		Number of repairs	Failure or Conclusion
				Casts per week	Tons per week	Tons per hr	Tap to Tap hr min	Fettling hr min	Charging hr min	Weeks	Casts		
United Steel Cos., Ltd. (Steel, Peech & Tozer): 1st campaign	Cold metal; fixed	80	oil	16.4	1321	7.74	10 23	52	4 37	24	381	2 small	Campaign ended; not roof failure
2nd campaign	Pig; fixed	80	creosote pitch oil	15.9	1281	7.81	10 17	1 1	4 24	19	275	....	Roof thin; checkers choked
3rd campaign	Pig; fixed	83.4		14.5	1215	7.25	11 29	1 14	4 44	38	518	....	Full repairs required
Comparable silica furnace	....	....	....	....	....	*6.8*	.....	.....	.....	*9.7 (1949) 12 (1950)*	*129 (1949) 157 (1950)*	....	.....
Stewarts & Lloyds Ltd. (Bilston)	Hot metal; tilting	56	oil	21	1233.4	7.36	7 50	1 3	3 20	48+	1606+	....	Campaign unfinished
Comparable silica furnace	....	....	....	*16.55*	*936*	*5.75*	*9 44*	*1 37*	*3 42*	*13*	*210*	....	.....
Royal Netherlands Blast Furnaces and Stee Works (Ijmuiden)	Hot metal; fixed	170	oil	13.3	2227	14.1	12 24	42	6 0	32.3	431	2 slight	Roof failure
Comparable silica furnace	....	....	....	....	....	....	.....	.....	.....	.....	*90*	....	.....

All-basic openhearths (continued)

the absorption of iron oxide is the most serious source of failure of roofs made of such materials. Further trials of basic bricks should be aimed at reducing this weakness and possible lines of investigation follow:

A search for chrome ores with higher Al_2O_3 and lower Cr_2O_3 contents, such as are possessed by certain ores from Cuba and Greece is required. This is based on laboratory bursting tests. These indicated that the chromite spinels, $FeCr_2O_4$ and $MgCr_2O_4$, had the highest bursting tendency. The aluminate spinel $MgAl_2O_4$ had a medium bursting tendency, while the ferrite spinel $MgFe_2O_4$ gave no bursting expansion.

The immediate inference is that to obtain a low bursting tendency, chrome ores should be selected in which Al_2O_3 has extensively replaced Cr_2O_3 in the chrome grains.

Ways of increasing the amount of matrix have to be developed. From time to time bricks have been made from chrome ores high in gangue minerals or by the artificial addition of serpentine or olivine. Bursting expansion is undoubtedly reduced, but only at the expense of mechanical strength at high temperatures.

Finer ore cuts bursting expansion

Alterations should be made in the grading and proportions of chrome ore. Minimum bursting expansion may be obtained by the incorporation of chrome ore crushed considerably finer than the grading normally associated with chrome-magnesite bricks.

Another possibility is to increase the magnesite-chrome ore ratio. This may possibly be done by including a part of the magnesia in the coarse fraction.

In the first furnace in Table I, the main roof construction adopted was one used extensively on furnaces of this size in Europe before the war, Fig. 1. In this type of construction, the arch is sprung and the roof is strengthened by ribs 19½ in. thick, with three rows of 12-in. blocks between. Above the rib a T-iron is suspended, curved to the roof radius. The ribs are holed in such a way that a wire can be passed through them and fastened to the T-iron, thus retaining them in position and partially suspending them. The T-iron, originally intended as a support for the ribs, also acts to prevent distortion of the roof.

Springs restrain thinned roof

When part of a roof becomes thin, there is usually a tendency for this part to lift. Some restraining influence is necessary to retain shape and prevent collapse. Large capacity springs are arranged on the back skewback to support the roof pressure and to absorb the movement due to expansion, Fig. 2.

The second furnace in Table I is that at Bilston, which is constructed similarly to that successfully used before the war. Here, 18-in. ribs have a series of channel runners over them to maintain shape, but the furnace roof is not supported by the runners. The outstanding feature of the Bilston furnace is that it has been maintained throughout its life to date at a temperature above 2912°F but below 3056°F. This undoubtedly has had much to do with its long life. Roof construction in the Dutch furnaces in Table I is similar, but with a lighter load.

At Messrs. Richard Thomas & Baldwins Ltd., Redbourn Works, channels were placed along the length of the roof to restrain the movement and maintain its shape. The ramps at the ends of the roof were fully suspended. A section of

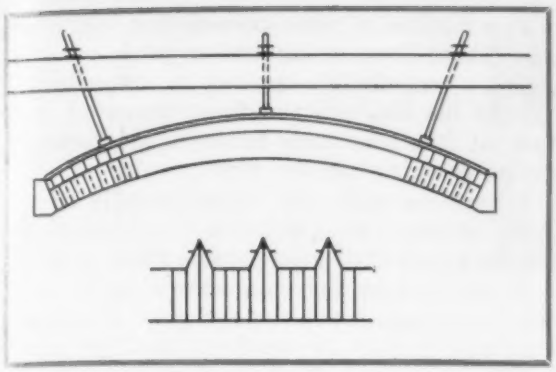


FIG. 1—Structural details of the Templeboro "B" furnace, United Steel Companies, Ltd. (Messrs. Steel, Peech & Tozer). Span is 19 ft 3 in.; length, 46 ft 6 in.; height, 7 ft; thickness, 12 to 19½ in.; distance between rib centers, 15-5/16 in.; ribs, 2 bricks wide. Main rout and sloping ramp is fired chrome magnesite, flat part of ramp unfired magnesite chrome. In the main roof rib bricks are wired to "T"-irons. Ramps are suspended.

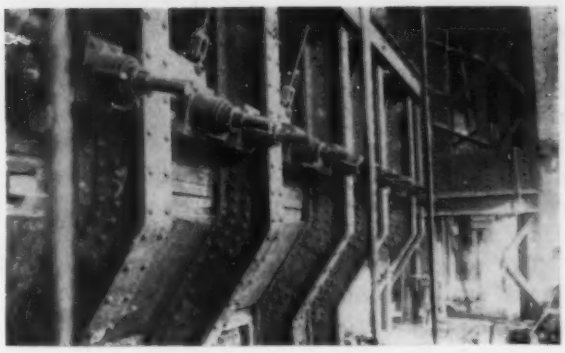


FIG. 2—Adjustable springs on back skewback support roof pressure and absorb movement due to expansion.

the roof of this furnace collapsed after 14 weeks and was replaced with silica.

In contrast to this comparatively short roof life, the end wall life has not yet terminated after 2½ years. The uptake slope away from the hearth and the end walls are arched so that waste gases do not impinge directly on the end wall. This principle has now been adopted for other furnaces.

Experiments with pressure-measuring cells built into two basic roofs, Fig. 3, at Bilston in 1938 are of interest in connection with basic roof design. The pressure cells are intended to show the effect of keying, spring adjustments and warming up on the pressure between brick faces and on the position of the center of pressure line between top and bottom of a brick in a particular course.

There were small variations in pressures near the front fixed skewback and large variations near the back moving skewback. It was noted that the center of pressure at the crown tended to drop when heated. It should be emphasized that many variables are involved and the readings only show a very general indication of the stress distribution.

Observations at Bilston in 1938 showed that during operation the load on each of the four sections of the roof must have been 60 tons. This was calculated to give a stress on one rib section of 79.4 lb per sq in., or 2¼ times the cold load stress. Assuming that all the load is distributed over the upper half of the bricks, the maximum stress would be 190 lb per sq in. This should be a safe stress on this colder part.

The good results obtained at Bilston may well be due to these factors. A very large pressure in the springs and brickwork can be carried on the cooler part of the arch. Furthermore, the high pressure may delay the falling away of the hot surfaces of the bricks due to iron oxide growth. The fact that this furnace is worked at a consistently high temperature, even during fettling, is another important factor tending to restrain the iron oxide growth. This is because there is no force trying to pull it away from the parent brick, since the roof changes its shape but little during operation.

These measurements, calculations and observations of the trial roofs under discussion suggest that the following principles underlie the successful design of all-basic furnace roofs: A) There should be sufficient force applied to the skewback channels to support the weight of the roof, as an arch; B) there should be sufficient movement at both back and front skewbacks to allow exact expansion change of shape; C) there should be no expansion joints across the arch; D) if any steel frame work is used on the arch shape, it should be able to change its curvature to accommodate changes in the arch brickwork. This brickwork takes a smaller radius when cold.

British Patent No. 572,124 for a fixed furnace and No. 623,144 for a tilting furnace claims to satisfy all these requirements. The patents were described at the conference by the patentee, J. A. Pluck. The design has so far only been tried in part under poor conditions. The con-

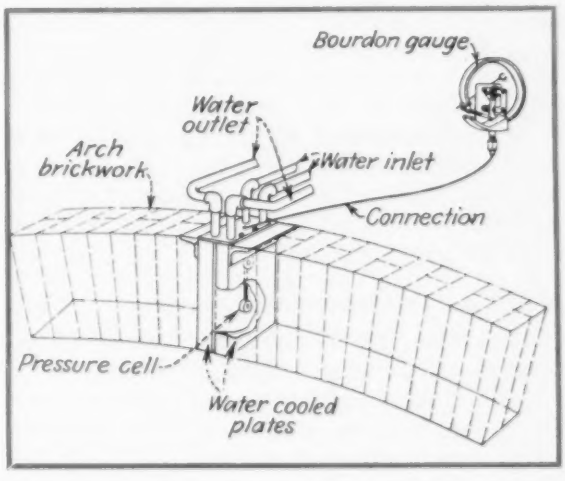


FIG. 3—Method of installing pressure-measuring cell in all-basic furnace roof at Bilston, England.

All-basic openhearths (continued)

ference heard of the strong probability of further trials in the near future.

In general it can be said that roof design, partly restrained and partly suspended, with spring loading expansion allowances, has become more or less standardized.

The operating experience on the trial furnaces can be subdivided into three sections: A) Starting up procedure and adjustments for expansion; B) types of fuel and fuel consumption; C) furnace life and maintenance.

TABLE II

COMPARATIVE TESTS OF BRICKS

Under load of 28 psi, rising temperature

Fired chrome-magnesite bricks (British manufacture)			Continental pre-war fired chrome-magnesite bricks	Typical openhearth silica bricks
Brick 1	Brick 2	Brick 3		
No failure at 3182° F	No failure at 3182° F	3182° F	3047° to 3164° F	3056° to 3092° F

Since chrome-magnesite bricks continue to expand with increase in temperature up to about 3092°F, rapid changes in temperature must be avoided. Allowances for expansion vary with the type of construction employed. Level roofs with no ramps require little longitudinal expansion allowance. The irregularities due to the steel plate joints are sufficient. In one case, an allowance of $\frac{1}{8}$ in. per ft was found to be satisfactory. At Bilston, not only was no allowance made for longitudinal expansion, but before the last few rings were laid in the center section of the roof, 5-ton jacks were used horizontally to compress and remove any slackness between the transverse joints.

Transverse expansion allowances do not appear to be necessary, where a spring-loaded skewback is used. Whether a constant load below 28 lb per sq in. should be maintained on the skewback by releasing the spring loading as expansion occurs, or whether all the expansion should be absorbed by the springs (thus increasing the load) for the sake of a constant roof radius, is a matter still open to argument. So is the question of the merits of suspension or restraining. It may be that for roofs over 20 ft in span, some form of suspension will always be necessary. It should not be required for roofs of smaller span.

Rich fuels particularly suitable

Rich fuels, such as liquid fuel and coke oven gas, are particularly suitable for the all-basic furnace. This is due to more than the high rate of fuel input alone. The absence of "burning out periods," during which the furnace is cooled below 1832°F, is also important. Among the furnaces under discussion, three were fired with fuel oil, one with pitch creosote and one with a mixture of pitch creosote and coke oven gas. Those firms using tar or pitch creosote report a considerable increase in carry-over of dust to the checkers and flues, compared with fuel oil. The iron oxide fumes in the furnaces during charging are also much greater.

Experience with fuel consumption in an all basic furnace varies between 6 pct less to 10 pct more than with a comparable silica furnace.

In addition to the data shown in Table I, some additional conclusions on service life and maintenance may be reached. The high operating temperature of a basic furnace is advantageous for the installation of a durable hearth. Chrome-magnesite door arches are not a success; water cooled door arches and jambs have proved better.

Slag pocket cinder hard to remove

It is a feature of all the trial furnaces that the vertical furnace ends and uptakes were the subject of the most severe wear. Particularly is this true of the target area in the end wall of single uptake furnaces. Contrary to some claims, slag pocket cinder proved difficult to remove, whether acid or basic slag pocket construction was used. When tar based fuels are used, there is a heavy deposit of dust, which at the high temperature reacts with the brickwork.

It is clear that the roof should not be allowed to cool below 2192°F and this still remains one of the outstanding necessities for efficient operation. Small fixed furnaces were considered to be the best for the first trials, but experience has shown that all-basic construction can be used on larger furnaces such as the 150-ton unit at Consett and on tilters such as the 56-ton hot metal furnace at Bilston.

Basic furnaces are fast working

One consideration applies to each unit which has been operated. It may be considered the main recommendation for successful operation. Because of its ability to operate at higher temperatures, an all-basic furnace should be a fast furnace and it must be treated as such. If operated at the same rate as a comparable silica furnace, it is doubtful if it will be economic. There is strong evidence that the fuel consumption will then be higher than normal.

The potential advantages claimed for all-basic furnaces are: A) Increased output due to the faster working made possible by the higher temperature that the basic roof can withstand; B) less shutdown time and, because of this and the higher melting rate, a reduction in overhead both in the melting shop and the mill; C) reduction in the man-hours required for brick-laying; D) less slag bulk on account of the elimination of silica drip; E) possibility of using the full advantages of liquid fuels.

On the other hand, a basic roof costs some five times more than a silica roof. It also introduces design and construction complexities.

Nodular iron hot-forged and rolled EXPERIMENTALLY

by J. A. Perry
Metallurgical Engineer
and
J. E. Rehder
Foundry Engineer
Physical Metallurgy Div.
Dept. of Mines and Technical Surveys
Ottawa, Ont.

Higher rolling temperatures and increased reduction improve mechanical properties, which are controllable by heat treating. Edge-cracking is a problem, holding the yield on width to 80 pct. Forgings, bars and plates have been made to date in a laboratory setup.

With the advent of the nodular cast irons, it was only natural that their hot-forming properties would be investigated. Studies of the hot-forming of nodular iron have been in progress in the Physical Metallurgy Research Laboratories of the Mines Branch at Ottawa for some time. Equipment used included a 1500-lb forging hammer, a 500-ton press, and an 18-in., 300-hp reversing mill, Fig. 1.

The ingots used in the present work were of two types. One was a 50-lb fluted, 3⅝-in. average diam round, the other a 5 x 2¾-in., flat-sided slab weighing about 45 lb. The molds were of cast iron, and were poured over the lip from a 500-lb ladle. The molds were cold when poured, and a tar-base wash was used. Fairly deep pipes developed in the ingots, with secondary piping in the slab ingots.

A few sand-cast billets were used. Severe edge-cracking on rolling due to the relatively poor surface condition indicated their usefulness to be small. Composition of the nodular irons used are given in Table I.

Cast irons (and nodular irons) are at least partially liquid at 2100°F. This means that soaking and rolling temperatures must be sufficiently below this figure to prevent melting. Ingots of nodular iron cast in metal molds contain considerable amounts of chill, or primary cementite. This must be decomposed before working. But since the cementite is fine-grained due to the chill mold, it is completely decom-

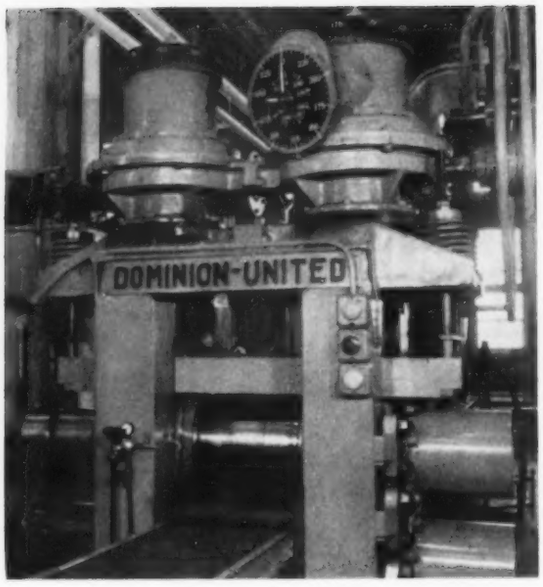


FIG. 1—Reversing mill, 300 hp, 18-in. width, used for hot-rolling tests on nodular irons.

Nodular iron forged & rolled (continued)

TABLE I

CHEMISTRY OF ROLLED NODULAR IRONS

Total carbon	3.10 -3.50 pct
Silicon	2.40 -3.00
Manganese	0.30 -0.50
Sulphur	0.01 -0.015
Phosphorous	0.02 -0.06
Copper	0.00 -0.70
Magnesium	0.040-0.090

posed by holding for about 2 hr at 1750°F.

This is for iron containing 2.60 to 3.00 pct silicon. Lower silicon content irons require a longer time. Since suitable hot-forming temperatures are at this level or above, decomposition of primary cementite is simply a question of soaking for a few hours before the first forming operation. Whether the ingot is formed immediately after soaking or annealing to decompose carbide or is cooled to room temperature before reheating for forming, there is no effect on the forming characteristics.

A series of slab ingots were rolled on an 18-in. reversing mill to slabs or plates at a series of working temperatures. It was found that within a limited temperature range, rolling was satisfactory. The upper temperature limit is determined by the melting point. For commercial practice, this is probably not higher than 1900°F.

The lower temperature limit is related to silicon content. Upper limits of these critical temperatures increase directly with the silicon content from 1460°F at 2 pct to 1520°F at 3 pct. If the iron is deformed below these temperatures, edge-cracking is severe. The higher forming temperatures, of course, result in more plastic material and smaller power requirement.

Fluted ingots weighing 50 lb were press-forged between 7-in. square dies in two heatings to 2-in., quarter-octagon sections. Maximum pressure used was 125 tons. The material worked down easily, and if corners of the die used had a generous radius no serious cracking occurred. Similar results were obtained on a 1500-lb forging hammer.

The 2 in. sections mentioned above were rolled to 1 in. rounds in seven passes, the intermediate passes being diamonds. Corner cracking was excessive, especially if the work had to be reheated. There was some indication that a rolling speed of 200 ft per min produced more cracking than did 100 ft per min. It is possible that the cracking might be reduced by using oval passes instead of diamonds. This is based on the premise that corners cool before the rest of the bar into the critical temperature range where sensitivity to cracking is high.

Slab ingots rolled down to plates approximately ¾-in. thick at reductions of 10, 15 and 22 pct per pass showed sensitivity to notches intentionally made in the edges. They cracked in from these notches. The amount of this defect is apparently unrelated to the amount of reduction per pass up to 22 pct. Reductions beyond this could not be explored due to limitations of the mill.

Edge-cracking only serious problem

No quantitative measurements were made, but the spread in rolling nodular iron is apparently greater than with steel in the same passes.

Edge-cracking has been the only serious difficulty with hot rolling or forging nodular iron. Normally, this is most noticeable on plates The defect is related to surface condition—sawn or edge-planed billets show a minimum amount and sand-cast ingots edge-crack severely. Flame-cut edges show variable amounts.

Repeated reheating, such as is necessary for small ingots, progressively increases severity of edge-cracking in flat rolling. Under normal conditions with ingots cast in metal molds and rolled to plate, edge-cracking causes the yield on width to be about 80 pct. By repeated reheating and edge shearing, 2¾-in. thick slab ingots have been reduced to excellent 0.170-in. thick plate.

A private communication reports that if a slab or ingot of nodular iron is dipped in molten slag before rolling, edge-cracking is eliminated. Whether this procedure is covered by the Jacques Sejournet patents is not known to the

TABLE II

EFFECT OF ROLLING TEMPERATURE ON PROPERTIES

Condition	Direction	Rolling temp., °F	Ult. tensile strength, psi	Yield strength, 0.2 pct offset, psi	Elongation in 2 in., pct	Impact strength (Izod), ft-lb	
						Notch parallel to surface	Notch perpendicular to surface
As-rolled	Longitudinal	1950	100,700	73,200	7	9	
		1550	73,600	56,200	12	11	9
	Transverse	1950	99,400	70,800	4	4	3
		1550	71,600	53,500	7	7	6
Annealed	Longitudinal	1950	66,200	51,000	20	15	12
		1550	65,200	50,400	14	11	12
	Transverse	1950	64,000	46,300	9	8	6
		1550	55,800	42,000	7	7	6

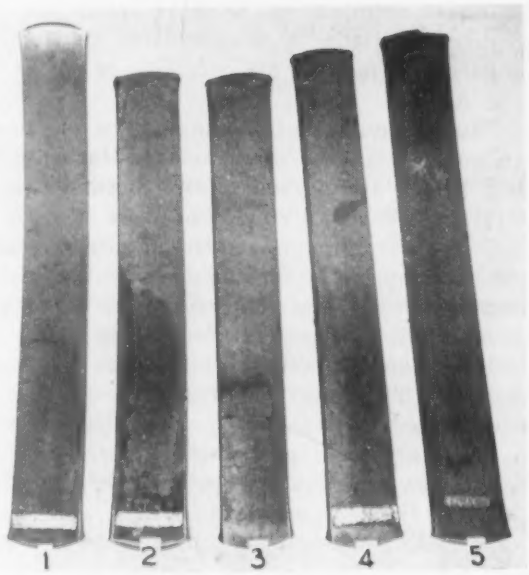


FIG. 2—Hot-rolled nodular iron slabs, ¾-in. thick. Reading from left to right, these are samples rolled at increasing temperatures, 1550° to 1950°F, in 100°F steps.

authors, and the procedure has not been used in these laboratories. This report, together with the fact that repeated reheating and rolling in air increases severity of edge-cracking, indicates that oxidation may play an important part.

A few ingots of 1.5 pct silicon content were rolled and compared in the bar passes with 3 pct material. No appreciable differences were noted. The important effects of silicon are apparently those relating to critical temperature range and ease of annealing.

A series of slabs were rolled at temperatures ranging from 1950°F to 1550°F to determine effects of rolling temperature on mechanical properties. Slabs rolled at lower temperature had lower tensile strength due to less pearlite in the finished, as-rolled slab. However, this difference disappeared on annealing the slabs to decompose all pearlite. Typical mechanical test results for two starting temperatures (finishing temperatures 150°F lower) are given in Table II. An illustration of the as-rolled slabs is shown in Fig. 2.

As might be expected, transverse tests do not show as high strength as do longitudinal. The difference is more evident in the yield and impact strengths than in the ultimate tensile strengths. The total reduction of cross-section of the slabs from which the test bars were taken was 65 pct. It is possible that further reductions would increase the difference between longitudinal and transverse properties.

Finished slabs annealed

To determine the effect of amount of reduction on mechanical properties, slabs were rolled from a 1950°F starting temperature to reductions of 25, 47, and 75 pct. Finished slabs were annealed to remove pearlite. Results of these mechanical tests are given in Table III. It can be seen that mechanical properties, especially ductility and impact strength, are improved by increasing reduction.

A nodular iron ingot after annealing or soaking to decompose any primary carbide has a familiar structure. Small, almost perfectly spherical nodules or spherulites of graphite are randomly distributed in a metallic matrix. Essentially, nodular iron is a silicon steel with 3 to 4 pct graphite distributed as nodules. The matrix, above the upper critical temperature, is always saturated with dissolved carbon.

On rolling, the nodules are deformed into lens-shaped discs, which are flattened more as the amount of reduction increases. With an equal amount of reduction in both transverse and longitudinal directions, the plates or saucers of graphite are approximately circular. The microstructure is approximately the same in each direction. However, flat rolling deforms the ingot largely in one direction, and the flattened graphite discs become ellipsoidal in plan.

The microstructure in the longitudinal direction then shows thinner and longer graphite stringers (cross-sections of the discs) than does that in the transverse direction. This is shown in Figs. 3 and 4. The effect of smaller

TABLE III

EFFECT OF REDUCTION ON PROPERTIES

Reduction, pct	Ult. tensile strength, psi	Yield strength, 0.2 pct offset, psi	Elongation in 1½ in., pct	Impact strength (Izod), ft-lb	
				Notched	Unnotched, blow parallel to surface
25	62,500	44,200	12	10	
47	65,000	46,700	16	10	33
75	65,600	47,500	18	14	95

reduction is shown in Fig. 5. The background or matrix structure in these as-rolled plates is one of pearlite and ferrite. The ferrite adjacent to the graphite results from decomposition of some pearlite as fairly rapid cooling occurs through the critical temperature range after rolling.

Heavier gage plate, which cools more slowly, will show greater amounts of ferrite in the microstructure. This is evident on comparison of Figs. 3 and 5. The structures are essentially uniform from edge to center.

It is evident, especially at the higher reductions, that the structure of hot-formed nodular iron is very similar to that of wrought iron. The stringers of slab are replaced by elongated plates of graphite in both cases. There are two important differences, however. The rolled nodular iron may have a matrix of mixed pearlite and ferrite as shown, be annealed to ferrite or normalized to all pearlite. It may also be quenched and drawn to any desired microstructure. All this is due to the fact that suitable thermal treatment frees the matrix of carbon, eutectoid carbon or an intermediate condition.

The other difference between rolled nodular iron and wrought iron is in machinability. No quantitative work has been done to the writer's knowledge on comparative machinability of the two metals at similar matrix structures. Yet certain differences in behavior may be expected. Wrought iron contains little silicon, but the slag stringers are abrasive. Rolled nodular iron has a silicon-bearing matrix which is more difficult to machine than a relatively pure ferrite. Still, the graphite stringers or discs are not abrasive and may even act as a tool lubricant.

At present there is no entirely satisfactory explanation for an interesting phenomenon in rolled nodular iron. Some of the nodules seem to resist deformation. Even in fairly heavily reduced sections, a few nodules practically undeformed may be noticed. This is shown in Fig. 6.

There is evidence that the nodules may have an onion-skin type of structure. During rolling, layers are pushed off in succession and stretched out into stringers or discs.

Nodular iron ingots cast in metal molds will have some primary carbide or cementite in the microstructure, especially at the corners. The amount will increase with decreasing ingot size and decrease as silicon and carbon contents increase. This chill or primary cementite is fine-grained and relatively easily decomposed. A relatively brief extension of soaking time will decompose it to free carbon. The iron dissolves in the surrounding austenite.

On cooling an ingot or formed shape through the critical temperature range, decreasing amounts of pearlite are formed as the cooling rate is decreased. At or below a rate of about 30° to 80°F per hr (dependitng on ingot size and chemical analysis) a completely ferritic matrix is produced.

FIG. 3—Longitudinal section of ¼-in. plate, 90 pct reduction, as rolled. Etched, 2 pct nital. 100X.

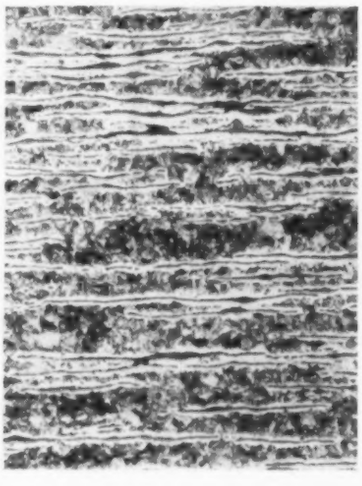


FIG. 4—Transverse section of ¼-in. plate, 90 pct reduction, as rolled. Etched, 2 pct nital. 100X.

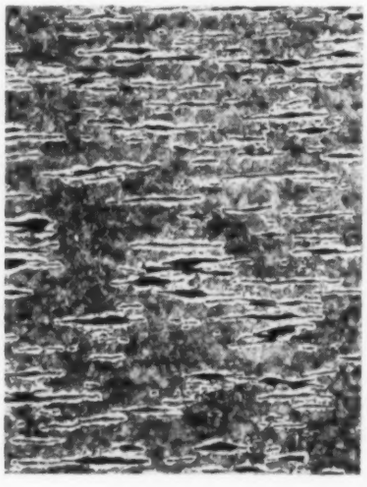
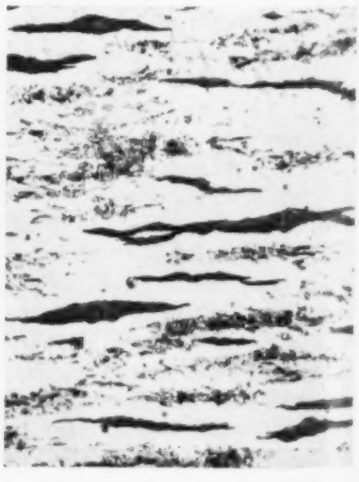


FIG. 5 — Longitudinal section of 13/16-in. plate, 70 pct reduction, as rolled. Etched, 2 pct nital. 100X.



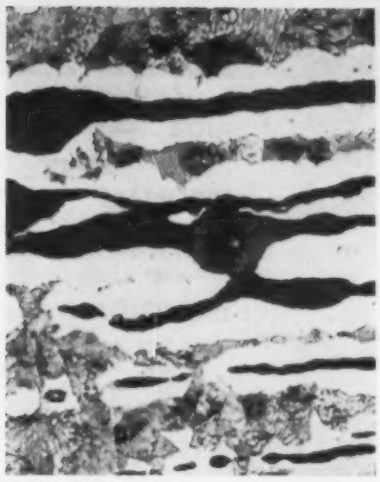


FIG. 6—Note undeformed nodule in this longitudinal section of 1/4-in. plate. Shown after 90 pct reduction, as rolled. Etched, 2 pct nital. 750X.

Controlled cooling for elimination of pearlite must start above the top of the critical temperature range. As mentioned before, this depends mainly on the silicon content of the iron. Control must be continued to below the bottom of the range, which for practical purposes is about 1340°F for nodular irons of 1.5 to 3.0 pct silicon.

Pearlite may also be decomposed by holding in the temperature range 1250° to 1330°F, after fairly rapid cooling through the critical temperature range. The shortest total time for complete elimination of pearlite is obtained with a controlled cooling rate.

Increasing amounts of pearlite increases the strength of nodular iron and decreases ductility. Thus, the strength of the iron may be controlled within wide limits by adjusting the cooling rate through the critical temperature range. This may be done after hot forming or during subsequent annealing or heat-treatment.

Nodular, malleable and cast irons may be quenched and drawn or tempered to produce a matrix of martensite or tempered martensite. This provides high hardness and strength. For cast nodular irons, the maximum hardness obtainable is 56 to 58 Rc, which is less than that of quenched eutectoid steel due to the presence of the graphite nodules. The hardenability is good due to the silicon content, and for lighter sections especially, an oil rather than a water quench should be used.

In heat treating for quenched and drawn structures, the iron should be heated to at least 1600°F to equalize the dissolved carbon content, but quenching should be done from just above the top of the critical temperature range (1550°F has been found practical). This avoids quench cracking, especially in complicated shapes.

NEW BOOKS

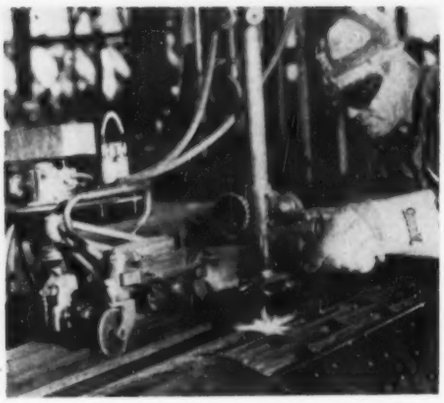
Basic Open Hearth Steelmaking, by the Physical Chemistry of Steelmaking Committee, AIME. This second, revised edition of an exhaustive and detailed exposition of the openhearth process presents a wealth of new material for all steelmen and students of industry. One of the Seeley W. Mudd series, the revised edition has been 5 years in the making.

Most of the original subject matter has been rewritten and brought up to date. The original division of the book into two parts, one on practice and another on principles, has been retained. Part One describes the basic openhearth furnace, its operation and its products. The presentation of current furnace practice is simple and unobscured by mathematics or involved reasoning. Part Two deals more thoroughly with the scientific and engineering principles underlying the openhearth process and the combustion and heat transfer problems associated with it.

Two new chapters have been added: One covers openhearth fuels, combustion and instrumentation; another deals with the kinetics of metallurgical processes. The wealth of material and depth of presentation again make this book a worthy addition to the reference shelves of all steelmen and students of industry. The American Institute of Mining & Metallurgical Engineers, 29 West 39th St., New York 18, N. Y. $8.00. 940 p.

Practical welding ideas for the production and welding engineer showing by

WELDING NOTEBOOK



JOB

(See photo, above)

Flame cutting pipe slots.

PROBLEM

Milling slots in ⅜-in. wall of 18-in. diam pipe was too slow.

SOLUTION

Blowpipe with two-nozzle coupon cutting adaptor was mounted on Oxweld cutting machine to cut both sides of 5/16 x 8 in. slot in one pass.

RESULTS

Production time cut 80 pct.

Data courtesy Linde Air Products Co., New York, N. Y.

JOB

Welding plowshares.

PROBLEM

To speed welding production of die-cut gunnel and forged share.

SOLUTION

An 8-place rotary fixture holds share and gunnel at correct welding angle. A copper bar backs up joint. Granulated Unionmelt composition covers the welding zone. Welding starts when edge of assembly passes beneath welding rod. Welding current is about 500 amp at 35 v ac. Welds are made at the rate of 19.1 in. per min.

RESULTS

Production increased 10 pct. Plowshares are stronger, have better fit than ordinary forge-welded product.

Data courtesy Linde Air Products Co., New York, N. Y.

JOB

Reclaiming worn tractor rails.

PROBLEM

To build up and hardface worn tractor rails and reduce replacement costs.

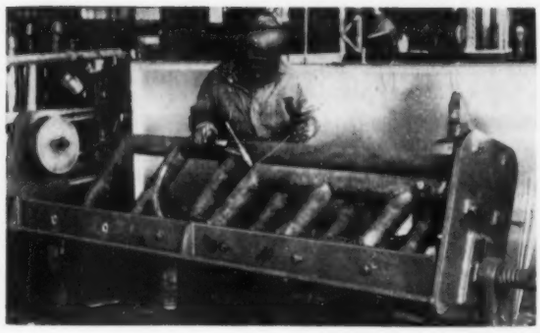
SOLUTION

After preheating and outlining the worn surface with a high-carbon electrode, the link was hardfaced with Amsco HF-60.

RESULTS

Tractor was placed back in service at about 1/3 the cost of new links.

Data courtesy American Brake Shoe Co., Chicago, Ill.



JOB

(See photo, above)

Repair stainless steel diesel exhaust manifolds.

PROBLEM

To find low cost repair method of sealing cracks at joints to prevent gas escape.

SOLUTION

Manifold is set up in jig. Cracks are filled using Heliarc torch and filler rod. Local heating shows up small cracks which are filled with columbium-bearing stainless steel filler rod. Stresses are relieved by heating pipe about 3 in. each side of weld.

RESULTS

Cost of reconditioning is about $40, excluding application of new lagging.

Data courtesy Union Carbide & Carbon Corp., Chicago, Ill.

JOB

(See photo, above)

Fabricate aluminum pressure vessel

PROBLEM

Small, light weight vessels must withstand high internal pressure meet ASME requirements.

SOLUTION

Cold-formed, machine-beveled segments of ⅜-in. 61S-T6 aluminum plate Aircomatic welded with 43 aluminum wire. All joints except closing seam are heat treated. Closing seam is welded in two passes from the outside, against back-up ring.

RESULTS

Completed vessels met all ASME requirements.

Data courtesy Air Reduction Sales Co., New York, N. Y.

Practical welding ideas for the production and welding engineer showing by actual case studies how others have solved tough welding and brazing problems.

JOB

(See photo, above)

Welding cast steel roller path to 1-in. plate for truck crane.

PROBLEM

To cut welding time. Welding the 1045 cast steel roller path to the truck plate using a low hydrogen type electrode required 4½ hr to make three passes around the 48 in. diam.

SOLUTION

Hidden arc welding used, with the semi-automatic welding gun mounted on a simple rig.

RESULTS

Three pass ½-in. fillet weld joining roller path to plate made in ½ hr.

Data courtesy Lincoln Electric Co., Cleveland, Ohio

JOB

Deep-drawing stainless steel.

PROBLEM

Steel dies caused galling, scratching and breakage of drawn part, especially at abrupt offset. Considerable time required to grind and buff out scratch marks.

SOLUTION

Male and female dies were undercut ¼ in. and overlaid with aluminum-bronze electrode having deposit hardness of 300 Bhn.

RESULTS

Breakage nearly eliminated, resulting in 15 pct increase in press production. Galling and scratching eliminated. Die life increased 300 pct.

Data courtesy Ampco Metal, Inc., Milwaukee, Wis.

(See photo, above)

JOB

Rebuilding tube-mill gear.

PROBLEM

Finding a long-service material that could be easily applied and did not require expensive machining or grinding after the gear was surfaced.

SOLUTION

Gear was bronze-faced using Ampco Trode 300 aluminum-bronze electrode having a deposit hardness of 300 Bhn.

RESULTS

Expected life of bronze-faced gear is three to five times that of original gear.

Data courtesy Ampco Metal, Inc., Milwaukee, Wis.

JOB

Weld aluminum hatch covers.

PROBLEM

Hatch covers, made from ¼-in. aluminum plate, sigma welded, must meet rugged operating conditions.

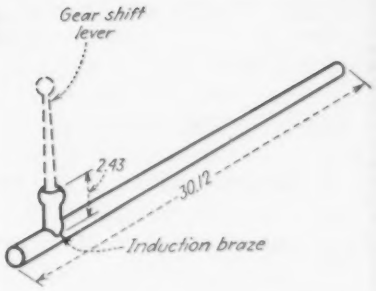
SOLUTION

Frame members clamped in jig. Butt and fillet welds made with sigma hand-welding unit. A 3/32 in. consumable electrode is supplied as a continuous coil of wire. Welding speed is about 25 in. per min.

RESULTS

Hatch covers passed rugged shock and load tests without difficulty.

Data courtesy Linde Air Products Co., New York, N. Y.



GEAR SHIFT SOCKET AND TUBE ASSEMBLY

JOB

(See drawing above)

Brazing tubular sections.

PROBLEM

Hand torch brazing too slow. Gas furnace heating objectionable because of excessive warpage of tubular section; high production would require too many holding fixtures.

SOLUTION

Installed 20 kw induction heating unit and an air-electric semi-automatic fixture. Four parts with preplaced silver solder rings are brazed and ejected while operator loads four more assemblies at second station.

RESULTS

Production of 400 brazed assemblies per hr with minimum distortion.

Data courtesy Weltronic Co., Detroit, Mich.

Uncle Sam wants to buy these

ALUMINUM PRODUCTS

Part I

Aluminum accessories and parts made by every standard fabricating process are needed by the armed forces. Incomplete, sample lists of products are given for each branch except the Air Force—which would like to hear from shops interested in sub-contracting—and the Ordnance Corps, to be covered in an early issue.

In modern warfare, aluminum marches, rides, flies and sails. Every one of the armed services uses the metal in a wide variety of equipment. Sizable orders for parts, assemblies, accessory units or complete products await those organizations with the required facilities.

The vast quantities of aluminum used in all kinds of aircraft components make the metal an obviously critical item for the Air Force. A completed listing of the USAF's needs would probably fill this issue of THE IRON AGE and almost every type of forgings, castings, extrusions and other types of fabricated aluminum parts would be included.

As a matter of fact, the Air Material Command would like fabricators of all kinds to let them know details on capacity, normal end-items, employee availability and other such vital statistics This information should be sent to the Directorate, Procurement & Industrial Planning, Production Resources Div., Air Material Command, Wright-Patterson Air Force Base, Ohio.

Other services' needs not so apparent

On the other hand, the important needs of the other services are not always readily apparent. Yet they are great and even a partial listing such as that accompanying this article is necessarily a lengthy one.

Weights and sizes run from the many tons of aluminum required for the Army's M-4 pontoon bridge (which has already proved successful in Korea) to mess gear weighing only ounces for the Navy. Castings, forgings, stampings, foil, rod, wire and other mill forms are all used by the Navy in a wide variety of equipment: periscopes, aircraft torpedoes, fuses and exploder mechanisms, fire control, radar kits.

The Marines have some uses for aluminum that are different from the Army's. They include water cans, portable field refrigerators and containers for parachute delivery of supplies.

Substitutions not always feasible

In spite of the armed services, attempts to find substitutes for strategic materials like aluminum wherever possible, military organizations such as the Army Transportation Corps are still heavy users. Cargo barges may take as much as 5000 lb each. Diesel-electric locomotives contain parts totaling 1260 lb. Transportation Corps items for which requirements are not releasable include: arctic cargo carrier, 4500 lb; trackless train for marshy terrain, 1500 lb; 8-wheel, acetic anhydride railway tank car, 6500 lb.

The information in the accompanying box tells you how orders to make one or more of the aluminum items in this partial listing can be obtained. Each part, product and unit is listed according to the branch of the armed services that is responsible for it. Further details are obtainable by writing to the procurement office concerned.

General Services Administration

Hospital supplies
Kitchen utensils
Laboratory apparatus, some types
Ladders, extension and small household
Trim, building (hinges, plates, etc.)

Department of the Army

Chemical Corps

These items are made in part from aluminum
Canisters for field protective masks—used by troops as protection against toxic gases and other poisonous agents.
Collective protectors—used by personnel manning command posts, field hospitals, communication centers, and similar installations.
Portable flame throwers

Corps of Engineers

All-aluminum:
Bridge erection boat, 19 and 27 ft types
Bridge, floating foot
Bridge, M-4 floating
Bridge, T-6 highway
Electric flood lights, 60-in.
Fixed floating divisional bridge, 50 ton
Mine detectors
Outboard motors, 22 and 25
Sniperscopes
Water purification units, 15, 35, and 50 gpm

Aluminum components:
Abutment shoes for bridges
Aluminum deck bulk, 8 and 14 ft
Landing mat sections
Pipe, plus joints and elbows
Raft ramp sections, for bridging
Transfer stiffeners and trestle sections

Quartermaster Corps

Canteen
Coffee pot
*Cooking outfit (for small detachments)
*Cooking outfit (officers)
*Field range (contains aluminum shell)
*Hand trucks, 2-wheel, materials handling
Meat can (mess kit)
Refrigerator trailer (shell and uprights of aluminum)
*Roller conveyers, materials handling
*Steam table insert
Stock pot (cooking, 6 to 20 gal in capacity)
Tea kettle
*These are or will be on procurement lists.

Signal Corps

Most items in this list are not 100 pct aluminum
AF amplifier
Antenna equipment
Direction finding group
Operations center
Power unit
Radio relay set
Radio sets, various types
Reel unit
Sound locating set
Sound ranging set
Switchboard
Teletypewriter set

Department of the Navy

Bureau of Aeronautics

Aircraft camera mounts
Aircraft control surfaces
Anti-blackout valves and fittings
Bomb-bay doors
Gun mounts
Ladders
Racks of various types
Switch boxes

Bureau of Medicine and Surgery

Bedside screen, folding, metal
Centrifuge, blood plasma
Field chests—six sizes, ranging from 24 x 12 x 6 in. to 30 x 18 x 20 in.
Operating lamp ceiling
Radiographic unit, mobile, 30 milliampere
Radiographic and fluoroscopic unit, 200 milliampere
Table, operating, obstetrical & delivery
Table, proctoscopic, adjustable
Table, radiographic, urological, tilting
Stereoscope, Wheatstone type, fluorescent

Bureau of Ordnance

Aluminum powder
Cartridge tanks
Cavity liners

Turn Page

WANT TO MAKE SOME OF THESE PARTS?

Write to:

Central Military Procurement Information Office, The Pentagon, Washington 25, D. C. *("Index of Military Purchasing Offices and Guide to Industry in Selling to the Military Departments");*

Army Procurement Information Center, The Pentagon, Washington, *(How to Sell to the U. S. Army);*

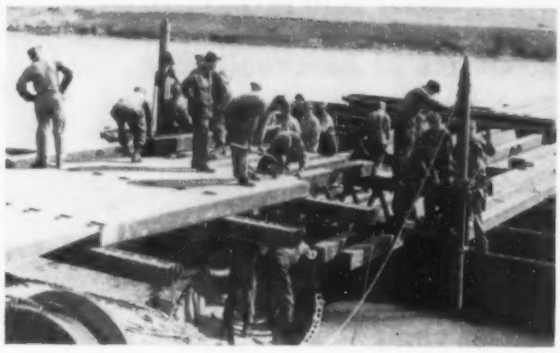
Office of Navy Material, Main Navy Building, 17th St. & Constitution Ave., N. W., Washington 25, *(Purchased Items, Navy Purchasing Locations, and Selling to the Navy);*

Air Force Procurement Division, Air Material Command, Wright-Patterson Air Base, Dayton, Ohio, *(Guide for Selling to the U. S. Air Force);*

Federal Supply Inquiry Office, General Services Administration, 7th & D Sts., S. W., Washington 25, *(Basic Facts About Selling to the Government).*

(The titles in italics following each address are the names of helpful booklets published by each of the armed services.)

DROP TEST being conducted on a section of aluminum pipe, which is used to speed up the supply of fuels to front line areas. Corps of Engineers photo.



ALL-ALUMINUM M-4 bridge. Corps of Engineers photo.

(Uncle Sam's aluminum needs (continued)

Bureau of Ordnance (continued)

Fuse parts
Projectile plugs
Rocket containers
Rocket parts
Signal containers

Bureau of Ships

Air ducts
Bulkheads, shipboard
Compressor rotors for diesel engines
Furniture, such as chairs and tables
Speaking tubes
Welding rods
(Not all are 100 pct aluminum, but contain considerable quantities.)

Bureau of Supplies and Accounts

Berths, including folding berths
Bookcases and book racks
Card tables
Chairs, for non-transport ships
Chairs, for transports (with and without arms)
Chart tables and cabinets
Coffee tables
Couches
Desks for radio operators
End tables
Hospital beds
Magazine racks
Mess benches
Stateroom beds
Stools, for non-transport ships
Tables for wardroom and warrant officer use

Bureau of Yards and Docks

Uses only two general types of aluminum products: flat sheet aluminum, to be placed in fire walls and similar construction. Those smaller items which may be furnished by the contractor (as part of a project) are listed under the Bureau of Supplies and Accounts.

The Ordnance Corps, not included in this listing, will be represented soon by a much more comprehensive breakdown of their aluminum purchases. This article is scheduled to appear in an early issue.

New tubing joint gives high leak resistance

At the midyear standardization conference of the American Petroleum Institute, a new tubing joint for oil well flow lines was described that has provided satisfactory resistance to leakage. Developed by Spang-Chalfant Div. of the National Supply Co., Ambridge, Pa. The joint has a pressure-sealing element independent of the threads.

This element consists of a conical sealing surface positioned at the small end of the pin thread and the corresponding location in box member.

Producing this joint had to be done economically and, essentially, only two operations are now required. Heating for the upsetting performed on both tubing ends as well as the actual forming itself is done in the same heat or pass.

A combined operation was also developed for the machining of the thread and seal. Seal-cutting tools are included in the die containing the thread chasers. While the chaser cuts a thread the full distance from the end of the pipe to the last scratch, the seal-cutting tool following behind cuts off all or part of those threads adjacent to the sealing surface.

A satisfactory finish was not obtained for sealing purposes until the taper of the seal was made slightly steeper (0.070 in. per in. on the diam) than that of the thread. The long trailing edge of the seal cutter takes a light cut off the surface left by the roughing section of the tool.

Two turns beyond hand-tight are all that is required to obtain good leak resistance. However, if subjected to repeated make-ups and the last one is less than that preceding it, it is possible that little or no sealing interference will be left. The only remaining leak resistance will be that provided by the threads themselves. It is for this reason that the new joint is not recommended for petroleum field working strings.

It is intended for flow strings only and has successfully performed in a Mississippi field. Here, two strings were set to approximately 7800 ft, with a top hole pressure of 2500 psi. Another string in a Louisiana field was set to about 9900 ft. Top hole pressure in excess of 6000 psi was successfully withstood by the new joint.

SUGGESTED EMERGENCY STEEL ALTERNATES FOR SOME STANDARD ALLOY GRADES

The table below should be used with great caution. Some of the steels listed have been tested and successfully put in production. Others have merely been suggested and a great debate is currently going on over the suitability of some of the boron steels for certain uses, particularly in the carburizing grades. At the moment, the table below is a compromise of the opinions of many experts, both steel producers and steel users. This table should be used only in conjunction with the Boron steel series of articles published in The Iron Age starting July 5, 1951, which elaborate on some of the variables and limitations encountered in the substitution of alloys for various types of parts.

Sometime in the future the differences of opinion will be compromised and a standard substitution table may be issued jointly by AISI and SAE. One of the chief hurdles to such a table is the question of choosing the alternate steels on a basis of equivalent hardenabilities in the core. Hardenability of the case of carburized parts is, in some instances, much more important than core hardenabilities. As yet, however, not enough data are available on case hardenabilities of the new steels to justify alternate steel selections on that basis. In fact, experience so far shows that in many cases the user has been using higher hardenability than actually needed. Therefore, the whole idea of substituting alternates on an identical hardenability basis is somewhat questionable.

POSSIBLE ALTERNATES FOR ALLOY GRADES

Based on Selected H-Band Hardenabilities for Standard Steels

AISI Grade	Hardenability Limits at 5/16 in.—Rc	Min Hardenability at 5/16 in. and 8/16 in.—Rc		Possible Alternates
1320	23 to 42	.....		80B20 80B17 50B15
1340	.....	40	33	80B40
2330	.....	34	27	TS 8630 50B30 5130 6130 80B30
3120	26 to 38	.....		80B20 6120 TS 8622
3140	.....	45	41	81B40 50B40 TS 8640
3310	34 to 42	.....		43B10
4037	.....	26	22	40B37[3] 14B35[4] 5035[4] 80B37[3] TS 8135[4] 14B37[3]
4047	.....	32	29	14B50 TS 8147
4140	.....	50	47	86B45 81B40 TS 4140
4320	29 to 41	.....		94B20 94B17 6120
4340	.....	52	52	86B45[1] 9840[2]
4620	21 to 34	.....		94B17 80B20 50B20 TS 4720 TS 8620
4640	.....	44	37	81B40 50B40

AISI Grade	Hardenability Limits at 5/16 in.—Rc	Min Hardenability at 5/16 in. and 8/16 in.—Rc		Possible Alternates
4815	27 to 41	.....		43B15 94B17 50B20[6]
4820	34 to 45	.....		94B17 43B15 46B20
5140	.....	38	33	80B40 50B40
5160	.....	56	47	80B60 50B60
8620	23 to 37	.....		80B20 94B17 50B20
8640	.....	46	39	80B40 50B40
8655	.....	56	54	50B60
8720	26 to 38	.....		80B20 94B17 50B20
8740	.....	46	40	81B40 50340
9260	.....	41	36	50B60
9262	.....	56	48	50B60
9310	32 to 42	.....		43B10
9440	.....	40	35	80B40 50B47
9840	.....	51	50	86B45[5]

[1] Under 3 in. in thickness.
[2] Over 3 in. in thickness.
[3] Over 1/2 in. diam.
[4] Up to 1/2 in. diam.
[5] Unless 9840 was substituted for 4340 in first place.
[6] Marquenched only.

Nonferrous Alloy SPECIFICATIONS

Compiled by

Norman E. Woldman

Consulting Metallurgical Engineer
Upper Montclair, N. J.

The uses and inter-relationship of the many nonferrous specifications employed in this country have always been a source of confusion where shortages must be overcome through interchangeable metals. Herein are detailed tables of all specifications for nonferrous structural metals, their common uses and their equivalents in other specifications. These tables have been condensed from data in the 1949-1950 Supplements of the ASTM; the AMS specifications as published by the Society of Automotive Engineers, and the SAE specifications as published by the same society in the 1951 handbook; and Air Force, Army, Navy, Federal and other specifications.

AMERICAN SOCIETY FOR TESTING MATERIALS SPECIFICATIONS

These specifications show only generalized description of the products by types and do not cover details of chemical composition, physical requirements, electrical requirements, or tolerances. The specification should be referred to for this information.

ASTM No.	Approximate Alloy	Condition	Form	Special Requirements*
B1-49	99.9% Cu	Hard drawn	Wire	C, P
B2-49	99.9% Cu	Medium hard	Wire	C, P
B3-45	99.9% Cu	Soft drawn or annealed	Wire	C, P
B4-42	99.9% Cu	Lake Copper	Ingots, slabs, wire bars, billets	C, P
B5-43	99.9% Cu	Electrolytic copper	Ingots, slabs, wire bars, billets	C, P
B6-49	Zinc (6 grades)	Spelter	Slabs	C
B8-49	Copper	Concentric	Stranded	C, P
B9-49	Bronze (3 grades)	Round or grooved	Trolley wire	E, P
B11-49	Copper (4 grades)	Hot rolled	Plates	C, P
B12-49	Copper (2 grades)	Hot or cold worked	Rods, staybolts	C, P
B13-49	Copper (2 grades)	Hard cold-drawn or annealed	Boiler tubes	C, P
B14-49	68.5% min Cu, bal. Zn	Cold-drawn	Boiler tubes	C, P
B16-49	60-63 Cu, 2.5-3.7 Pb, bal. Zn	Cold-drawn 2 tempers	Screw rod	C, P
B19-49T	68.5-71.5 Cu, bal. Zn	Cold-rolled 7 tempers	Sheet, strip, & discs	C, P
B21-49T	Naval Brass (3 grades)	Cold-finish (3 tempers)	Rods, bars, shapes	C, P
B22-49T	Bronze (4 grades)	Cast	Bridge & expansion plate	C, P
B23-49	White Metal (14 grades)	Cast bars	Babbitt	C, P
B24-46	Aluminum (2 grades) 99.30 & 99.75 min.	Ingots	For remelting	C
B25-43T	Discontinued—Replaced by B209-49T			
B26-48T	Aluminum alloys (16 grades)	Cast	Sand castings	C, P
B29-49	Lead, 99.7 to 99.94 min (7 grades)	Pig, refined	For remelting	C
B30-49	Copper alloys (27 grades)	Ingots	For sand castings	C
B32-49	Solder (30 grades)	Ingots, bars, fabricated	Soft solders	C
B33-49	Tinned copper	Soft or ann'l'd	Wire	E, P
B36-49T	65-95 Cu, bal. Zn (8 grades)	7 tempers	Sheet, strip	C, P
B37-49	Aluminum (5 grades) 85-98 Al	Cast or rolled, shot	For steel making	C
B39-42	Nickel (4 grades) 97.75-99.5 min	Electrolytic shot, ingot	For remelting	C
B42-49	99.9 min Cu, .04 max P	Hard-drawn, seamless	Pipe	H
B43-49	84-86 Cu, bal. Zn	Hard-drawn, seamless	Pipe	C, H
B47-49	99.9 min Cu	Hard-drawn	Trolley wire, round, grooved	P
B-48-49	99.9 min Cu	Drawn & annealed	Round cornered, rectangular & square wire	E, P
B49-41	99.9 min Cu	Hot-rolled	Rods	E, P
B51-42	Discontinued	Not replaced		
B52-48	Phosphor copper (2 grades)	Cast	Ingots, slabs	C

ASTM No.	Approximate Alloy	Condition	Form	Special Requirements*
B53-46	Silicon copper (3 grades)	Cast	Ingots, slabs	C
B58-42T	Discontinued	Replaced by B179-49T		
B60-41	Discontinued	Replaced by B143-49T		
B61-49	Bronze 86-90 Cu, 6 Sn	Castings	Steam or valve parts	C, P
B62-49	85 Cu, 5 Sn, 5 Pb, 5 Zn (ounce metal)	Cast	Castings	C, P
B64-43	Brass (2 grades) 50-52 Cu, bal. Zn	Grains, lumps	Brazing solder	C
B66-49	Bronze (4 grades)	Castings	Locomotive wear parts	C, F
B67-49	Brass-backs, lead alloy lined	Castings	Lined journal bearings	C, F
B68-49	99.9 min Cu (3 types)	Bright annealed	Seamless tubing	C, P
B69-39	Zinc	Rolled	Coiled sheet, strip, plate	D, T
B72-47T	99.7 min Cu	Fire refined	Ingots, ingot bars	C
B73-49	Silver solders 10-80 Ag (8 grades)	Rolled	Sheet, strip, wire grains	C, P
B74	Discontinued	Replaced by B144-49		
B75-49T	99.4-99.92 Cu (4 grades)	5 tempers	Seamless tube	C, P
B78-42T	Discontinued	Replaced by B209-49T		
B79-43T	Discontinued	Replaced by B209-49T		
B80-49T	Magnesium alloys (6 grades)	Cast	Sand castings	C, P
B82-46	80 Ni, 20 Cr	Annealed or drawn	Electrical heating elements	C, E
B83-46	60 Ni, 15 Cr, bal. Fe	Annealed, drawn, rolled	Electrical heating elements	C, E
B85-49T	Aluminum alloys (10 grades)	Cast	Die castings	C, P
B86-48	Zinc alloys (3 grades)	Cast	Die castings	C, P
B88-49	99.9 min Cu	Cold-drawn or annealed	Seamless tubes Type K, L & M	C, H, P
B89-42T	Discontinued	Replaced by B211-49T		
B90-49T	Magnesium alloys (2 grades)	Hard-rolled or annealed	Sheets	C, P
B91-49T	Magnesium alloys (4 grades)	Forgings	Forgings	C, P
B92-45	99.8 min Mg	Ingot or stick	For remelting	C
B93-49T	Magnesium alloys (8 grades)	Ingot	For sand & die & perm. mold castings	C, P
B94-49T	Magnesium alloys (3 grades)	Cast	Die castings	C, P
B96-49	Copper silicon alloys (2 grades)	Hot & cold-rolled, anneal	Sheets for pressure vessels	C, P
B97-49	Copper silicon alloys (3 grades)	7 tempers	Sheets, plates, strip	C, P
B98-49	Copper silicon alloys (4 grades)	5 tempers	Rods, bars, shapes	C, P
B99-49	Copper silicon alloys (3 types-16 grades)	6 tempers	Wire	C, P
B100-49	Copper alloys (2 types)	Rolled	Plates & sheets for bridges	C
B101-40	99.9 Cu, lead-coated (2 types-3 classes)	Soft or hard temper	Lead coated copper sheets	L, C
B102-48	Sn & Pb base alloys (5 types)	Cast	Die castings	C
B103-49	Phosphor bronze (5 grades)	Rolled, 6 tempers	Plate, sheet, strip	C, P
B105-49	Copper alloys (10 grades)	Hard-drawn rounds	Wire for electrical conductors	E, P
B107-49T	Magnesium alloys (4 grades)	Extruded	Bars, rods, shapes	C, P
B108-49T	Aluminum alloys (17 grades)	As cast or heat treaded	Permanent mold castings	C, P
B109-43T	Discontinued	Replaced by B209-49T		
B111-49	Copper alloys (16 grades)	Seamless 3 tempers	Tubes & ferrules	C, P
B112-41T	Discontinued	Replaced by B179-49T		
B115-43	99.9 min Cu	Electrolytic lump	Cathode copper	C, E
B116-49	Copper	Grooved	Trolley wire	C, P
B120-41T	Discontinued	Replaced by B194-49T, B195-49T, B197-49T		
B121-49T	Leaded brass (6 grades)	Rolled & annealed 6 tempers	Sheet & strip	C, P
B122-49T	Copper-nickel Cu-Ni-Zn	8 grades, 6 tempers	Sheet & strip	C, P
B124-49	Copper & copper base alloys (12 grades)	Rods, bars, shapes	For hot forgings	C, P
B125-42T	Discontinued	Replaced by B179-49T		
B126-46	Discontinued	Replaced by B178-49T		
B127-49T	70 Cu, 30 Ni	Rolled, 3 tempers	Plate, sheet, strip	C, P

ASTM No.	Approximate Alloy	Condition	Form	Special Requirements*
B129-49T	68.5-71.5 Cu, bal. Zn (2 grades)	Drawn & annealed	Cups	C, P
B130-49T	89-91 Cu, bal. Zn	Annealed & rolled, 11 tempers	Strip for ammunition	C, P
B131-49T	89-91 Cu, bal. Zn	3 tempers	Cups, bullet jackets	C, P
B132-49	Manganese bronze (2 grades)	Cast	Sand castings	C, P
B133-49T	99.9 min Cu	Hot-rolled, ex-extruded, 2 tempers	Rods, bars, shapes	C, P
B134-49	Brass (8 grades)	Annealed & cold-drawn, 7 tempers	Wire	C, P
B135-49T	Brass (6 grades)	Annealed, light or hard-drawn	Seamless tubes	C, P
B138-49	Manganese bronze (2 grades)	Hot or cold-rolled— 3 tempers	Rods, bars, shapes	C, P
B139-49T	Phosphor bronze (5 grades)	Cold-rolled or drawn	Rods, bars, shapes	C, P
B140-49	Leaded red brass (2 types)	Annealed & cold-worked, 2 tempers	Rods, bars, shapes	C, P
B143-49	Tin & leaded tin bronze (4 grades)	Cast	Sand castings	C, P
B144-49	High lead-tin bronze (5 grades)	Cast	Sand castings	C, P
B145-49	Leaded red brass (4 grades)	Cast	Sand castings	C, P
B146-49	Leaded yellow brass (3 grades)	Cast	Sand castings	C, P
B147-49	Yellow brass (4 grades)	Cast	Sand castings	C, P
B148-49	Aluminum bronze (4 grades)	Cast	Sand castings	C, P
B149-49	Leaded nickel-brass (3 grades)	Cast	Sand castings	C, P
B150-49T	Aluminum bronze (2 grades)	Hot-rolled or extruded; cold-drawn or anneal	Rods, bars, shapes	C, P
B151-49T	Cu-Ni-Zn alloys (4 grades)	Cold drawn, 5 tempers	Rods, bars	C, P
B152-49T	Copper (8 types)	Hot or cold-rolled, 7 tempers	Sheet, strip, plate	C, P
B159-49T	Phosphor bronze (3 grades)	Cold-drawn, 5 tempers	Wire	C, P
B160-49T	99 min nickel (2 grades)	Forged, hot or cold-rolled	Rods & bars	C, P
B161-49T	99 min nickel (2 grades)	Drawn, seamless, 4 tempers	Pipe & tubing	C, P
B162-49T	99 min nickel (2 grades)	Hot-rolled & cold-drawn, pickeled or polished	Sheet, strip, plate	C, P
B163-49T	Nickel, Ni-Cu, & Ni-Cr alloys (4 grades)	Cold-drawn, 2 tempers	Seamless tubes & ferrule	C, H, P
B164-49T	Nickel-copper alloys (2 grades)	Hot-rolled or cold-finished 4 tempers	Rods, bars, forgings	C, P
B165-49T	Nickel-copper alloy	Cold-drawn	Seamless pipe & tubing	C, H, P
B166-49T	Ni-Cr-Fe alloy	Hot-rolled, cold-drawn	Rods, bars, forgings	C, P
B167-49T	Ni-Cr-Fe alloy	Cold-finished, seamless	Pipe and tubing	C, H, P
B168-49T	76 Ni, 16 Cr, 8 Fe	Hot-rolled, cold-finished 3 tempers	Plate, sheet, strip	C, P
B169-49T	Aluminum bronze (3 alloys)	Cold-rolled or annealed, 2 tempers	Sheet, strip	C, P
B170-47	99.92 min copper	Deoxidized, electrolytic	Wire, bar, billet, cake	E, P
B171-42T	Copper alloys (5 grades)	Hot-rolled	Plates	C, P
B172-49T	Copper (3 classes)	Coated or uncoated	Rope lay bunch-stranded conductors	C, P
B173-49T	Copper (2 classes)	Coated or uncoated	Rope lay concentric stranded conductors	C, P
B174-49T	Copper (8 classes)	Coated or uncoated	Bunch stranded conductors	C, P
B175-45T	99 min nickel	Round	Wire for lamps & electronics	C, E, P
B176-49T	Brass (3 alloys)	Cast	Die castings	C, P
B178-49T	Aluminum alloys (5 grades)	Rolled	Sheet & plate for welded pressure vessels	C, P
B179-49T	Aluminum alloys (33 grades)	Cast	Ingots for sand die & perm.	C, P

Nonferrous specifications (continued)

ASTM No.	Approximate Alloy	Condition	Form	Special Requirements*
			mold castings	
B184-43T	Aluminum alloys (2 grades)	Coated	Arc welding electrodes	C, W
B186-43T	Discontinued	Not replaced		
B187-49T	Copper	2 tempers	Rods, shapes, bus bars	C, P
B188-49T	Copper	Seamless	Bus pipes & tubes	C, P
B189-48	Copper	Lead coated, soft temper	Wire	C, P
B194-49T	2 Be, bal Cu	Solution treated & age-hardened	Plate, sheet, strip	C, P
B195-49T	2 Be, bal Cu	2 thermal treatments, 4 tempers	Strip	C, P
B196-49T	2 Be, bal Cu	Rolled, 4 tempers	Rod & bar	C, P
B197-49T	2 Be, bal Cu	Cold-drawn & heat treated, 8 tempers	Wire	C, P
B198-49	Silicon bronze & silicon brass (3 alloys)	Cast	Sand castings	C, P
B199-49T	Magnesium alloys (2 grades)	4 tempers	Perm. mold castings	C, P
B206-49T	Cu-Ni-Zn alloys (4 grades)	Drawn or rolled, 5 tempers	Wire	C, P
B207-46T	35 Ni, 15 Cr alloy	Annealed	Castings	Ht
B209-49T	Aluminum alloys (10 grades)	Clad & bare, all tempers	Sheet & plate	C, P
B210-49T	Aluminum alloys (4 grades)	10 tempers	Seamless tubing	C, P
B211-49T	Aluminum alloys (9 grades)	12 tempers	Bars, rods, wire	C, P
B216-49	99.98 min copper	Fire refined	Cake	C
B217-49T	Magnesium alloys (4 grades)	Extruded	Round tubing	C, P
B221-49T	Aluminum alloys (8 grades)	Extruded, 6 tempers	Bars, rods, shapes	C, P
B225-48T	Copper alloys (10 grades)	Bare & coated	Arc welding electrodes	C, P
B226-49	Copper	Soft, bare & coated	Cored, annular, concentric-lay stranded conductors	C, E, P
B230-49T	99.45 min aluminum	Hard-drawn	Wire	E, P
B231-49	Aluminum (5 classes)	Hard-drawn	Concentric-lay stranded conductor	E, P
B232-48T	Aluminum	Steel-reinforced	Concentric-lay stranded cond.	E, P
B233-49	99.45 min aluminum (4 types)	Rolled	Rods	E, P
B234-48T	Al, 1-1.5 Mn	Drawn, clad & unclad	Seamless tubes	C, P
B235-49T	Aluminum alloys (6 grades)	Extruded, 6 tempers	Tubing	C, P
B236-48T	99.45 min aluminum (3 types)	Rolled	Bars for electrical purposes	C, P
B327-49T	Antimony	Refined	Ingot	C
B240-49T	Zinc alloys (3 grades)	Cast	Ingot	C
B241-49T	Aluminum alloys (3 grades)	Extra heavy	Pipe	C P

*C = chemical; D = ductility; E = electrical; F = fracture; H = hydrastatic; Ht = high temperature; Lc = lead coated; P = physica; W = welding

U. S. ARMY SPECIFICATIONS

These specifications show only generalized description of the products by types and do not cover details of chemical composition, physical requirements, electrical requirements, or tolerances. The specification should be referred to for this information. The comparative specifications shown are approximate in all cases, as there may be differences in chemistry, physical and other requirements.

Spec. No.	Approximate composition	Form	Similar to ASTM
57-18A Gr A	99.5 Sn	Tinfoil	
57-18A Gr B	98 Sn	Tinfoil	
57-21-1D	Magnesium	Powder	
57-23A Gr A	99.9 Ag	Various	
57-23A Gr B	92.1 Ag, bal. Cu	Various	
57-23A Gr C	89.6 Ag, bal. Cu	Various	
57-26-1	Tungsten	Powder	
57-55	60 Ni, 23 Cu, 2.5 Fe, 2 Mn	Wrought billets	B164-49T
57-72 Gr 1	92.5 min Al, 3-7 Si	Castings	B108-49T-SC64C B179-49T-SC64C
57-72 Gr 2	95 Al, 2.5 Cu, 2 Mn	Castings	
57-72 Gr 3	92 min Al	Castings	
57-72 Gr 4	92 min Al, 4 Cu, 3 Si	Castings	B26-48-CS43A
57-72 Gr 4A	Al, 3.5 Mg	Castings	B26-48T Gr G4A
57-72 Gr 5	Al, 8 Cu	Castings	B26-48T CS72A
57-72 Gr 6	Al, 10 Mg	Castings	B26-48T-CS66A B108-49T-CS86A
57-72 Gr 7	90 Al, 7 Cu, 3 Zn	Castings	B108-49T-CN42A
57-72 Gr 8	80 min Al	Castings	
57-74-1E Gr 1	Mg, 6 Al, 3 Zn	Sand castings	B80-49T-AZ63A
57-74-1E Gr 2	Mg, 1.2 Mn	Sand castings	B80-49T-MIB
57-74-1E Gr 3	Mg, 9 Al, .8 Zn	Die castings	B94-49T-AZ91A
57-77	63-67 Cu, 1 Si, bal. Zn	Die castings	B176-49T
57-92-1B	97.5 Pb, 2.5 Sb	Bullet cores	
57-92-2	98 Pb, 1 Ba, .75 Ca	Castings, bearings	
57-93-2A Cl A	Zn, 4 Al, .05 Mg	Die castings	B86-48 Gr XXIII
57-93-2A Cl B	Zn, 4 Al, 1 Cu	Die castings	B86-48 Gr XXV
57-97-1 Cl 7	44-46 Ag, 15 Cu, 16 Zn, 24 Cd	Brazing wire	
57-97-1 Cl 8	34-36 Ag, 26 Cu, 21 Zn, 18 Cd	Brazing wire	
57-98 Gr A	43 Sn, 43 Pb, 14 Bi	Solder—various	
57-98 Gr B	67 Bi, 17 Pb, 17 Sn	Solder—various	
57-99-1	94.9 Pb, 5-6 Ag	Solder—various	
57-151-1A	99 Aluminum	Plate, sheet	B209-49T Gr 990A
57-152-2A	Al, 4.5 Cu (17S)	Sheet	B209-49T Gr GS41A
57-154A	Ni-Cr alloy	Various	B163, B166, B167, B168
57-154-1B	99.94 Cu, .06 Ag	Rod	B170-47
57-159	Mg alloys (4 grades)	Forgings	B91-49T
57-160	80 Cu, 20 Zn, low brass	Sheet, strip	B36-49T Gr 4
57-160	85 Cu, 15 Zn, rich low brass	Sheet, strip	B36-49T Gr 3
57-161-2a	60 Cu, 2 Pb, bal. Zn	Forgings	B124-49 Gr 2
57-161-3C1A	71-74 Cu, 2-3 Pb, bal. Zn	Strip	B124-49 Gr 2 & 5 B121-49T
57-161-3C1B	62-65 Cu, 1.5-2.5 Pb, bal. Zn	Strip	B124-49 Gr 2 & 5 B121-49T
57-162-1	60 Cu, 1 Sn, bal. Zn (Naval brass)	Bars, rods	B21-49T Gr A
57-171	90 Cu, 10 Zn, gilding metal	Various	B36-49T Gr 2
57-171-1B	90 Cu, 10 Zn, gilding metal	Various	B36-49T Gr 2
57-171-2	95 Cu, 5 Zn	Sheet, strip	B36-49T, Gr 1
57-171-3A	90 Cu, 10 Zn, Gilding metal	Bullet cup	B131-49T
57-172-1d	70 Cu, 30 Zn (Cartridge Brass)	Sheet	B36-49T B19-49T
57-172-2c	70 Cu, 30 Zn (Cartridge Brass)	Cups	B129-49T
57-173C	70 Cu, 30 Zn (Cartridge Brass)	Sheets	B19-49T B36-49T
57-174A	75 Ni, 15 Cr, 9 Fe, .1 Mn	Wrought	B166, B167, B168
57-187-2B Gr 17	Al, 4.5 Cu (17S)	Tubing	B209-49T-GS41A B210-49T-GS41A
57-187-2B Gr 24	Al, 4.5 Cu, 1.5 Mg (24S)	Tubing	B210-49T-CG42A
57-187-3	Al, 2.5 Mg, .25 Cr (52S)	Tubing	B210-49T-GR20A
57-190-1	Brass	Seamless tube	B135-49T Gr 1 & 2
57-191A	65-69 Cu, 1.7 Pb, bal. Zn	Seamless tube	B135-49T Gr 4 & 6
57-192-1B	Cu, 5 Zn, 2 Sn, 1 Si	Seamless tube	
57-193 Cl 11	Mg, 1.2 Mn	Tubing	B217-49T-MIA
57-193 Cl 18	Mg, 3 Al, 1 Zn	Tubing	B217-49T-AZ31A
57-203-1A	Cu alloy	Welding rod	
57-203-11	Cu, 9-13 Al, 3-5 Fe	Welding rod	
57-203-12	Cu, 9-13 Al, 3-5 Fe	Welding rod	
57-211	Copper	Magnet wire	B1, B2, B3, B4 & B5
57-217A	Brass	Arming wire	B134-49 Gr 4
57-220A	56 Cu, 18 Ni, 26 Zn	Resistance wire	
57-226A	99.9 copper	Anodes	B1, B2, B3, B4 & B5
57-227A	99 nickel	Anodes	B160-49T
57-228A	99.9 zinc	Anodes	B6-49 Gr 3
57-229A	87 Cu, bal. Zn	Anodes	B36-49T Gr 3
EQQA-601 Cl 13	Al, Cu, Si alloy	Sand castings	B26-48T Gr CG100A
EQQA-601 Cl 14	Al, Si, Cu alloy	Sand castings	B26-48T
AXS 1328	Magnesium alloy	Extruded bars, rods, shapes	B107-49T

U. S. AIR FORCE SPECIFICATIONS

These specifications show only generalized description of the products by types, and do not cover details of chemical composition, physical requirements, electrical requirements, or tolerances. The specification should be referred to for this information. The comparative specifications shown are approximate in all cases, as there may be differences in chemistry, physical and other requirements.

Spec. No.	Approximate composition	Form	Similar to ASTM
10235-A	Al, 4.5 Cu, 1.5 Mg (24S)	Tubing	B210-49T-CG42A
10285-A Cl A	99.0 aluminum	Spray gun wire	B24-46 Gr 99.0
10285-A Cl AA	Al, 1 Zn	Spray gun wire	
10285-A Cl C	66 Cu, 34 Zn	Wire	B36-49T Gr 8
10285-A Cl D	90 Cu, 10 Zn Gilding metal	Wire	B134-49 Gr 2
10285-A Cl F	99.9 copper	Wire	B48-49T
10285-A Cl G	60 Ni, 23 min Cu, 3.5 Fe, 3.5 max Mn	Wire	B164-49T
10285-A Cl J	99 nickel	Wire	B160-49T
10300	Cr-W-Co	Hardfacing welding rod	
10302-A	Zn, 4 Al, 3 Cu	Welding rod	B86-48 Gr XXI
10350	Al, Ni, Cu	Wire	
11066	Al, 4.5 Cu, 1.5 Mg (24S)	Plate, sheet	B209-49T-CG42A
11067	Al, 4.5 Cu, 1.5 Mg (Clad 24S)	Alclad plate, sheet	B209-49T-CG42A
11069	Al, 1 Mg, 1 Mn	Tubing	
11070-A	Cu, 2 Be	Various	B196-49T B197-49T
11074-B	99 aluminum	Foil	B24-46 Gr 99.0
11076	80 Cu, 10 Al, 5 Ni, 5 Fe	Castings	B30-49 Gr 9D B148-49 Gr 9D
11077	99.0 aluminum	Corrugated sheet	B24-46 Gr 99.0
11077-Al-1-Alclad	Al, 4.5 Cu (Clad 17S)	Corrugated sheet	B209-49T-GS41A
11077-Al-2-Alclad	Al, 4.5 Cu, 1.5 Mg (Clad 24S)	Corrugated sheet	B209-49T-CG42A
11077-Al-2	Al, 4.5 Cu, 1.5 Mg (24S)	Corrugated sheet	B209-49T-CG42A
11078-A Gr 1	10 Cd, 50 Bi, 29 Pb, 13 Sn	Cast fusible alloy	
11078-A Gr 2	7 Cd, 50 Bi, 43Pb	Cast fusible alloy	
11079-A Gr 1	Al, 5 Si	Ingots	B179-49T-S5A
11079-A Gr 2	Al, Cu, Si alloy	Ingots	B179-49T-C4A
11084 Gr 1	64-67 Ni, 28-31 Cu, 3 Si	Castings	
11084 Gr 2	62-65 Ni, 29-32 Cu, 4 Si	Castings	
11306 Gr A	85 Cu, 5 Sn, 5 Pb, 5 Zn	Castings	B62-49
11306 Gr B	88 Cu, 10 Sn, 2 Zn	Castings	B143-49 Gr 1A
11306 Gr C	83 Cu, 8 Sn, 8 Pb	Castings	B144-49 Gr 3B
11306 Gr D	72 Cu, 28 Pb	Castings	
11307-A	Al, 5 Si, 1 Cu	Castings	B26-48T-SC51A
11308-A	Al, 7 Si	Castings	B179-49T-SG70A B26-48T-SG70A
11309-A	Al, 10 Mg	Castings	B26-48T-G10A
11310	Al, 4-5 Cu	Castings	B26-48T
11311	Al, 5 Si	Castings	B26-48T-S5A
11312	Al, Cu, Si alloy	Castings	B26-48T
11317-B Gr 1	Mg, 1.2 Mn	Sheet	B90-49T-MIA
11317-B Gr 2	Mg, 7 Al	Sheet	
11318 Gr 1	Mg, 7 Al, 3 Zn	Tubing	
11318 Gr 2	Mg, 1.2 max Mn	Seamless tubing	B217-49T-MIA
11319	Mg, 10 Al	Castings	B80-49T-AM100A
11321	Mg, 9 Al	Forgings	B91-49T-AZ80A
11322 Gr A	Mg, 1.2 Mn	Welding rod	B107-49T-MIA
11322 Gr B	Mg, 10 Al, 1 Zn	Sand castings	B80-49T-AZ91C
11322 Gr C	Mg, 6 Al, .7 Zn	Welding rod	B107-49T-AZ61A
11324	90 min aluminum	Sand castings	
11325	Al, 4-5 Cu	Sand castings	B26-48T
11326	Al, 1 Mg, .6 Si, .2 Cr, (61S)	Plate, sheet	B209-49T-GS11A
11327	Al, 1.2 Mg, .6 Si, .25 Cr	Tubing	B210-49T
11328	Zn, 4 Al, 3 Cu	Ingots	B86-48 Gr XXI
11329 Gr A	99 aluminum	Rivet wire	B211-49T Gr 990A
11329 Gr AD	Al, 3 Cu, .8 Si (Al7S)	Rivet wire	B211-49T-GS41A
11329 Gr D	Al, 4.5 Cu (17S)	Rivet wire	B211-49T-CG41A
11329 Gr DD	Al, 4.5 Cu, 1.5 Mg (24S)	Rivet wire	B211-49T-CG42A
11329 Gr M	Al, 5 Mg (56S)	Rivet wire	B211-49T
11330-B	Al, 5 Cu, .5 Pb, .5 Bi (11S)	Bars, rods	B211-49T-CP60A
11331	88-90 Cu, 9.5-10.5 Sn	Bearings	B139-49T Gr D
11332	Mg, 7 Al	Tubing	B217-49T-AZ61A
11333	Mg, 1.2 Mn	Tubing	B217-49T-MIA
11334	Mg, 3 Al, 3 Zn	Tubing	B217-49T-AZ31B
11335	Mg, 7 Al	Bars, shapes	B107-49T-AZ61A
11336	Mg, 1.2 Mn	Wrought	B107-49T-MIA
11337	Mg, 3 Al, 3 Zn	Wrought	B107-49T-AZ31B
11338	Mg, 7 Al	Sheets	B90-49T-AZ61A
11339	Mg, 1.2 Mn	Sheets	B90-49T-MIA
11340	Mg, 3 Al, 1 Zn	Sheets	B90-49T-AZ31A
11342 Gr A	80 Cu, 15 Ag, 5 P	Various	Silver solder
11342 Gr B	50 Ag, Cu, Zn, Cd	Various	Silver solder
11345	Mg, 7 Al	Forgings	B91-49T-AZ61A
11346	Mg, 3 Al, 5 Sn	Forgings	B91-49T-TA54A
11347 (13X)	Al, 12 Si (13)	Die casting	B85-49T-S5
11347 (43)	Al, 5 Si (43)	Die casting	B85-49T-S4
11347 (356)	Al, 7 Si (356)	Perm. mold casting	B108-49T-CS72A
11348	Mg, 10 Al	Perm. mold castings	B199-49T-AM100A
11349	Mg, 9 Al, 2 Zn	Perm. mold castings	B199-49T-AZ92A
11350	63-70 Ni, .5 Al, 2 Mn, bal. Cu	Wire	B164-49T
11351	Al, 5 Zn	Sand castings	B26-48T-ZG61A
11352-A	Al, 7-8 Zn, 1-2 Mg, .5 Cu, .5 Mn	Forgings	B221-49T-ZG62A

AIR FORCE-NAVY AERONAUTICAL SPECIFICATIONS

These specifications show only generalized description of the products by types, and do not cover details of chemical composition, physical requirements, electrical requirements, or tolerances. The specification should be referred to for this information. The comparative specifications shown are approximate in all cases, as there may be differences in chemistry, physical and other requirements.

Spec. No.	Approximate composition	Form	Similar to ASTM
AN-A-4-1	Al, 3.5 Cu, 3.5 Si (S-108)	Sand castings	B26-48T-CS43A
AN-A-5-1	Al, 4 Cu, 2 Si (S-195)	Sand castings	B26-48T
AN-A-10b-1	Al, 2.5 Mg, 1.5 Cu 5.5 Zn (75S)	Clad plate, sheet	
AN-A-11b-1	Al, 5.5 Zn, 2.5 Mg, 1.5 Cu (75S)	Rods, bars, shapes, wire	
AN-A-13-2	Al, 4.5 Cu, 1.5 Mg (clad 24S)	Clad plate, sheet, strip	B209-49T-CG42A
AN-A-17-1	Al, 5.2 Zn	Sand casting	B26-48T-ZG61A
AN-A-20-1	Aluminum	Foil	
AN-A-26-1	Al, 4 Mg (214)	Sand casting	B26-48T-G4A
AN-A-31-1	Al, 4 Cu, 2 Ni, 1.5 Mg (142)	Sand castings	B26-48T-CN42A
AN-A-36	Al, 4.5 Cu, 2.5 Si (B195)	Perm. mold castings	B108-49T-CS42A
AN-A-37	Al, 6.5 Zn, 2 Mg, 1.5 Cu (303)	Extruded shapes	B221-49T-ZG62A
AN-A-38	Al, 12 Si	Die castings	B85-49T-S9
AN-A-41	Al, 5 Si, 1 Cu (355)	Perm. mold castings	B108-49T-SC51A
AN-A-42	Al, 4.5 Cu, 1.5 Mg (24C2)	Bars, sheets, tubes	B211-49T B210-49T B209-49T
AN-B-16	Al bronze	Bars, rods	B150-49T
AN-M-20	Mg, 6 Al, 1 Zn	Forgings	B91-49T-AZ61A
AN-M-21	Mg, 8, 5 Al, .5 Zn	Forgings	B91-49T-AZ80A
AN-M-22	Mg, 1.5 Mn	Forgings	B107-49T-MIA
AN-M-23-1	Mg, 3.5 Al, 5 Sn	Forgings	B91-49T-TA54A
AN-M-24-1	Mg, 6.5 Al, 1 Zn	Extruded bars, rods, shapes	B107-49T-AZ61A
AN-M-25-1	Mg, 8.5 Al, .5 Zn	Extruded bars, rods, shapes	B107-49T-AZ80A
AN-M-26-1	Mg, 1.5 Mn	Extruded bars, rods, shapes	B107-49T-MIA
AN-M-27-1	Mg, 3 Al, 1 Zn	Extruded bars, rods, shapes	B107-49T-AZ31B

Nonferrous specifications (continued)

Spec. No.	Approximate composition	Form	Similar to ASTM
AN-M-28	Mg, 6 Al, .7 Zn	Sheet, strip	B90-49T
AN-M-29	Mg, 3 Al, 1 Zn	Sheet, strip	B90-49T-AZ31A
AN-M-30	Mg, 1.5 Mn	Sheet, strip	B90-49T-MIA
AN-M-36-1	Mg alloys (3 grades)	Sand castings	B80-49T
AN-QQ-A-354	General spec. for Al alloys	Castings	B26-48T
AN-QQ-A-366 (13)	Al, 12 Si (13)	Die castings	B85-49T-S5
AN-QQ-A-366 (13X)	Al, 12 Si (13X)	Die castings	B85-49T-S9
AN-QQ-A-366 (85)	Al, 4 Cu, 5 Si (85)	Die castings	B85-49T-SC2
AN-QQ-A-366 (85X)	Al, 4 Cu, 6 Si (85X)	Die castings	B85-49T-SC5
AN-QQ-A-366 (218)	Al, 8 Mg (218)	Die castings	B85-49T-G2
AN-QQ-A-376	Al, 5 Si, 1.5 Cu	Castings	B179-49T-SC51A B26-48T-SC51A
AN-QQ-A-379	Al, 4 Cu, 1.5 Mg	Castings	B179-49T-CN42A B26-48T-CN42A
AN-QQ-A-383	Al, 4-5 Cu, 2-3 Si (B195)	Perm. mold castings	B108-49T
AN-QQ-A-386	Al, 12 Si, 2.5 Ni, 1 Cu, 1 Mg (32)	Perm. mold castings	B108-49T B179-49T
AN-QQ-A-390	Al, 4-5 Cu, 1.5 Si (195)	Sand castings	B26-48T-C4A
AN-QQ-A-392	Al, 10 Mg	Sand casting	B26-48T-G10A
AN-QQ-A-394	Al, 7 Si	Sand casting	B26-48T-SG70A
AN-QQ-A-397	Al, 4 Cu, 3 Si	Sand casting	B26-48T-CS43A
AN-QQ-A-399	Al, 7 Cu, 2 Si (212)	Sand castings	B26-48T B179-49T
AN-QQ-A-402	Al, 3.8 Mg	Sand casting	B26-48T-G4A
AN-QQ-A-405	Al, 5 Si	Sand casting	B26-48T-S5A
AN-QQ-A-671	99.9 min Cd	Anodes	
AN-QQ-A-686	Zinc	Slabs	B6-49 Gr 1
AN-QQ-B-646	60 Cu, 1 Sn, 39 Zn (Naval Brass)	Bars, rods	B124-49 Gr 3 B21-49 Gr A
AN-QQ-B-672-1	88 Cu, 9 Al, 2 Fe (Al Bronze)	Castings	B30-49T Gr 9A B148-49 Gr 9A
AN-QQ-M-56 Cl 1A	Mg, 6 Al, 3 Zn	Sand castings	B80-49T-AZ63A
AN-QQ-M-56 Cl 1B	Mg, 1 Mn	Sand castings	B80-49T-MIB
AN-QQ-M-56 Cl 1C	Mg, 9 Al, 2 Zn	Sand castings	B80-49T-AZ92A
AN-QQ-N-268-1	72 Ni, 16 Cr, 8 Fe	Rods, bars	B166-49T
AN-QQ-N-271a-2	72 Ni, 16 Cr, 8 Fe	Sheet, strip	B168-49T
AN-QQ-W-298 (2S)	99.0 Al	Wire	B24-46 Gr 99.0
AN-QQ-W-298 (17S)	Al, 4.5 Cu (17S)	Rivet wire	B211-49T-GS41A
AN-QQ-W-298 (A17S)	Al, 4.5 Cu (A17S)	Rivet wire	B211-49T
AN-QQ-W-298 (24S)	Al, 4.5 Cu, 1.5 Mg (24S)	Rivet wire	B211-49T-CG42A
AN-QQ-W-298 (56S)	Al, 5 Mg (56S)	Rivet wire	B211-49T
AN-T-13	Al, 1.2 Mn (3S)	Flex. tubing	B209-49T
AN-T-70-1	59-68 Cu, 0-1.5 Sn, bal. Zn	Tubing	
AN-T-71	Mg, 6 Al, 1 Zn	Tubing	B217-49T-AZ61A
AN-T-72	Mg, 4 Al, Mn	Tubing	B217-49T-AZ31B
AN-T-73	Mg, 1.5 Mn	Tubing	B217-49T-MIA
AN-WW-T-831	72 min Ni, 16 Cr, 8 Fe	Seamless tubing	B163-49T B167-49T
AN-WW-T-833	72 min Ni, 16 Cr, 8 Fe	Round welded tubing	B163-49T B167-49T

U. S. NAVY SPECIFICATIONS

These specifications show only generalized description of the products by types, and do not cover details of chemical composition, physical requirements, electrical requirements, or tolerances. The specifications should be referred to for this information. The comparative specifications shown are approximate in all cases, as there may be differences in chemistry, physical and other requirements.

Spec. No.	Approximate composition	Form	Similar to ASTM
17B12	99.45 min Al	Bus bars	B24-46 Gr99.5
17E4e	70 Ni, 23 Cu	Welding rod	
17W2 Gr A	Copper-nickel	Resist. wire	
17W2 Gr B	Copper-nickel	Resist. wire	
17W2 Gr C	Ni-Cr-Fe	Resist. wire	
17W2 Gr D	Ni-Cr-Fe	Resist. wire	
17W2 Gr E	Ni-Cr	Resist. wire	
17W2 Gr F	Al-Cr-Fe	Resist. wire	
22C5a	Bronze	Flex. cable	
22W3c	Copper	Hard wire	
22W5f	94 min Cu, 3.5 Sn, .5 P	Spring wire	B100-49 Gr 1
22W9a	Copper	Soft wire	B3-45
33T3b Type 2	Al 1.2 Mn (3S)	Flex. tubing	B210-49T-MIA
33T3b Type 3	Al, 1.2 Mn (3S)	Flex. tubing	B210-49T-MIA
33T3 Type 2	Al, 2.5 Mg, .2 Cr (52S)	Flex. tubing	B210-49T-GR20A
33T3 Type 3	Al, 2.5 Mg, .2 Cr (52S)	Flex. tubing	B210-49T-GR20A
41G5 Gr A	70 Ni, 30 Cu	Rods, bars	B164-49 Cl A
41G5 Gr B	Ni, Cu, Al alloy	Bars, rods	
43R5e Gr A	99.0 min Al (2S)	Rivet wire	B24-46 Gr 99.0
43R5e Gr B	Al, 1.2 Mn (3S)	Rivet wire	
43R5e Gr C	Al, 4Cu (17S)	Wire, rivets	B211-49T-CS41A
43R5e Gr D	Al, 4.5 Cu, 1.5 Mg (24)	Wire, rivets	B211-49T-CG24A
43R5e Gr E	Al, 1.2 Mg, .3 Cr (53S)	Rivet wire	B211-49T-GS11B
43R5e Gr F	Al, 4.5 Cu (17S)	Rivet wire	B211-49T-GS41A
43R5e Gr G	Al, 5 Mg (56S)	Rivet wire	B211-49T
44P2g	99.9 min copper	Seamless pipe	B68-49 Type DLP B75-49T Type DLP
44P12c Gr A	85 Cu, 15 Zn	Pipe	B43-49
44P12c Gr B	66 Cu, .5 Pb, bal. Zn	Seamless pipe	B135-49 Alloy 3
44T7f	72 Cu, 1 Sn, bal. Zn	Tubing	B111-49 Admiralty
44T12c	99.9 min copper	Seamless tube	B68-49 B75-49T
44T15b Gr 1	85 Cu, 15 Zn	Seamless tube	B43-49 Red Brass
44T15b Gr 2	66 Cu, .5 Pb, bal. Zn	Seamless tube	B135-49 Alloy 3
44T16b	85 Cu, 15 Zn	Seamless tube	B111-49 Red Brass
44T19b	99.0 min Al	Seamless tube	B24-46 Gr 99.0
44T20a	Al, 1.2 Mn (3S)	Tubing	B210-49T-MIA
44T21d	Al, 4.5 Cu (17S)	Rod, tube	B211-49T-CS41A B235-49T-CS41A
44T22a	Al, 4.5 Cu (17S)	Streamline tube	B211-49T-CS41A B235-49T-CS41A
44T23a	Cu, 5 Si, 2 Zn	Seamless tube	
44T24	95 min Al, 1 Mg, 1 Mn	Seamless tube	
44T28a	Al, 4.5 Cu, 1.5 Mg (24S)	Seamless tube	B210-49T-CG42A
44T30	Al, 1.2 Mg, .3 Cr (53S)	Seamless tube	B210-49T-GS11B
44T32b	Al, 2.5 Mg, .25 Cr (52S)	Seamless tube	B210-49T-GR20A
44T35 Al 8	Mg, 6 Al, 1 Zn	Tubing	B217-49T-AZ61A B107-49T-AZ61A
44T35 Al 11	Mg, 1 Mn	Tubing	B217-49T-MIA
44T35 Al 15	Mg, 3 Al, 1 Zn	Tubing	B217-49T-AZ31B
44T38a	63-70 Ni, 2.5 Fe, 2 Mn, bal. Cu	Seamless and welded tube	B163-49T B165-49T
44T39	32 Ni, 65 Cu	Tubing	B171-49 Cu-Ni
44T40b	30 Ni, 70 Cu	Tubing	B111-49 (70-30 Cu-Ni)
45V18	55 Ni, 33 Cu, 12 Sn	Valve castings	
46A1 Cl 1	Al, 5 Zn, Cu	Sand casting	B26-48T-ZG61A
46A1 Cl 2	Al, 5 Si	Sand casting	B26-48T-S5A
46A1 Cl 2A	Al, 5 Si	Sand casting	B179-49T-S5B
46A1 Cl 3	Al, 7 Si	Sand casting	B26-48T-SG70A
46A1 Cl 3A	Al, 7 Si	Sand casting	B26-48T-SG70A
46A1 Cl 4	Al, 5 Cu, 1 Si	Sand casting	B26-48T-C4A
46A1 Cl 4a	Al, 5 Cu, 2 Si	Sand casting	B26-48T-CS43A
46A1 Cl 5	Al, 3 Mg	Sand casting	B26-48T-G4A
46A1 Cl 6	Al, 1 Mg, 2 Cu	Sand casting	B26-48T
46A2c Gr 1	98 min Al	Ingots	B37-49 Gr 980A
46A2c Gr 2	99.0 min Al	Ingots	B24-46 Gr 99.0
46A2c Gr 3	99.3 min Al	Ingots	B24-46 Gr 99.2
46A2c Gr 4	99.5 min Al	Ingots	B24-46 Gr 99.5
46A2c Gr 5	99.75 min Al	Ingots	B24-46 Gr 9970
46A3e	99.0 min Al	Wrought	B211-49T Gr 990A
46A4g	Al, 4.5 Cu, Mn (17S)	Bars, rods	B211-49T-CM41A
46A5 Cl 1	Al, 5 Zn, Cr	Ingots	B179-49T-ZG61A
46A5 Cl 2	Al, 5 Si	Ingots	B179-49T-S5A
46A5 Cl 3	Al, 7 Si	Ingots	B179-49T-SC122A
46A5 Cl 4	Al, 4 Cu, 2 Si	Ingots	B179-49T-C4A
46A5 Cl 4a	Al, 4 Cu, 2 Si	Ingots	B179-49T-C4A
46A5 Cl 5	Al, 3 Mg	Ingots	B179-49T-G4A
46A5 Cl 6	Al, 1 Mg, 2 Cu	Ingots	B179-49T

The Iron Age chart of comparable arc

Corrosion Resisting Steel Arcwelding Electrodes

ASTM-AWS Specifications No	Current	Air Reduction Sales Co.	Alloy Rods Co.	All-State Welding Alloys Co.	American Agile Corp.	Arcos Corp.	Canadian Liquid Air Co.	Champion Rivet Co.	Eutectic Welding Alloys Corp.	General Electric Co.	Harnischfeger Corp.	Hobart Bros. Co.	Hollup Corp.	Lincoln Electric Co.	The McKay Co.	Marquette Mfg. Co.
E-308-15	dc	Airco 19-9 Lime	Arcaloy 308 Lime	All-State 18-8	Agile 18 8	Chromend K	Arcaloy 308 Lime	308-1	Eutec-Staintrode B (dc)	W-1308	Harstain 18 8	No. 308	Sureweld 19 9	Stainweld A7, A5	McKay 18-8 dc Lime	
E-308-16	ac or dc	Airco 19-9 Titania	Arcaloy 308 ac-dc		Agile 18-8	Stainlend K	Arcaloy 308 Titania	308-2	Eutec-Staintrode B (ac-dc)	W 2308	Harstain A 18-8	No. 308 ac			McKay 18 8 ac-dc	No. 308
E-309-15	dc	Airco 25-12 Lime	Arcaloy 309 Lime		Agile 25-12	Chromend HC	Arcaloy 309 Lime	309-1	Eutec-Staintrode C (dc)	W-1309	Harstain 25-12	No. 309	Sureweld 25-12	Stainweld B-Cb	McKay 25-12 dc Lime	
E-309-16	ac or dc	Airco 25-12 Titania	Arcaloy 309 ac-dc		Agile 25-12	Stainlend HC	Arca'oy 309 Titania	309-2	Eutec-Staintrode C (ac-dc)	W-2309	Harstain A 25 12	No. 309 ac			McKay 25-12 ac-dc	
E-310-15	dc	Airco 25-20 Lime	Arca'oy 310 Lime	All-State 252	Agile 25 20	Chromend HCN	Arcaloy 310 Lime	310-1	Eutec-Staintrode D (dc)	W-1310	Harstain 25 20	No. 310	Sureweld 25-20	Stainweld D	McKay 25-20 dc Lime	
E-310-16	ac or dc	Airco 25-20 Titania	Arcaloy 310 ac-dc		Agile 25-20	Stainlend HCN	Arcaloy 310 Titania	310-2	Eutec-Staintrode D (ac-dc)	W-2310	Harstain A 25 20	No. 310 ac			McKay 25-20 ac-dc	
E-316-15	dc	Airco 18-8 Mo Lime	Arcaloy 316 Lime			Chromond K Mo	Arca'oy 316 Lime	316-1	Eutec-Staintrode A (moly) (dc)	W-1316	Harstain 18 8 2 Mo	No. 316	Sureweld 19-9 Mo	Stainweld C-Cb	McKay 18-8 Mo (316) dc Lime	
E-316-16	ac or dc	Airco 18-8 Mo Titania	Arcaloy 316 ac-dc			Stainlend K Mo	Arca'oy 316 Titania	316-2	Eutec-Staintrode A (moly) (ac-dc)	W-2316	Harstain A 18 8 2 Mo	No. 316 ac			McKay 18-8 Mo (316) ac-dc	
E-317-15	dc	Airco 18-8 3.5 Mo Lime	Arcaloy 317 Lime		Agile 18-8 Mo	Chromend 18-8 Mo	Arca'oy 317 Lime	317-1		W-1317	Harstain 18 3 3 Mo		Sureweld 19-9 Mo		McKay 18 8 Mo (317) dc Lime	
E-317-16	ac or dc	Airco 18 8 3.5 Mo Titania	Arcaloy 317 ac-dc		Agile 18-8 Mo	Stainlend 18-8 Mo	Arcaloy 317 Titania	317-2		W-2317	Ha stain A 18-8-3 Mo				McKay 18-8 Mo (317) ac-dc	
E-330-15	dc	Airco 35N 15 Cr Lime	Arcaloy 330 Lime			Chromend 15 35	Arca'oy 330 Lime	330-1		W-1330			Sureweld 15-35		McKay 15-35 dc Lime	
E-330-16	ac or dc	Airco 35N 15 Cr Titania	Arcaloy 330 ac-dc			Stainlend 15-35	Arcaloy 330 Titania	330-2		W-2330					McKay 15-35 ac-dc	
E-347-15	dc	Airco 19-9 Cb Lime	Arcaloy 347 Lime		Agile 18 8 Cb	Chromend 19 9 Cb	Arcaloy 347 Lime	347-1	Eutec-Staintrode A (dc)	W-1347	Harstain 18-8 Cb	No. 347	Sureweld 19-9 Cb	Stainweld A7Cb, A5Cb	McKay 18-8 Cb dc Lime	
E-347-16	ac or dc	Airco 19-9 Cb Titania	Arcaloy 347 ac-dc		Agile 18-8 Cb	Stainlend 19 9 Cb	Arcaloy 347 Titania	347-2	Eutec-Staintrode A (ac-dc)	W 2347	Harstain A 18-8 Cb	No. 347 ac			McKay 18-8 Cb ac-dc	
E-410-15	dc	Airco 12 Lime	Arcaloy 410 Lime			Chromend 12	Arcaloy 410 Lime	410-1		W-1410					McKay 12 Cr dc Lime	
E-410-16	ac or dc		Arca'oy 410 ac-dc				Arcaloy 410 Titania	410-2							McKay 12 Cr ac-dc	
E-430-15	dc	Airco 16 Cr Lime	Arcaloy 430 Lime		Agile 16 Cr	Chromend 16	Arcaloy 430 Lime	430-1		W-1430					McKay 16 Cr dc Lime	
E-430-16	ac or dc		Arcaloy 430 ac-dc		Agile 16 Cr		Arcaloy 430 Titania	430-2							McKay 16 Cr ac-dc	
E-502-15	dc	Airco 4-6 Cr Mo Lime	Arcaloy 502 Lime		Agile 4-6 Cr	Chromend 5M	Arcaloy 502 Lime	502-1	Eutectrode 6H	W-1502	Harchrome 5 Cr		Sureweld 4-6 Cr		McKay 5 Cr Mo dc Lime	
E-502-16	ac or dc		Arcaloy 502 ac-dc		Agile 4-6 Cr		Arcaloy 502 Titania	502-2							McKay 5 Cr Mo ac-dc	

Copper Arcwelding Electrodes

ASTM AWS Symbol	Air Reduction Sales Co.	Alloy Rods Co.	All-State Welding Alloys Co.	American Agile Corp.	Ampco Metal, Inc.	Arcos Corp.	Canadian Liquid Air Co.	Champion Rivet Co.	Eutectic Welding Alloys Co.	General Electric Co.	Lincoln Electric Co.	Marquette Mfg. Co.
E-Cu									EutecTrode 30 (ac), 300 (dc)			
E-Cu Sn A	Airco 70				Phos-Trode	Bronzend P			EutecTrode 28 (ac), 280 (dc)	W 70		
E-Cu Sn C		Bronze Arc	All-State No. 24	Agile Bronze			Bronze Arc	Bronze Devil			Aerisweld	
E-Cu Ni						Nicuend						
E-Cu Si	Airco 72				Sil-Trode	Bronzend E			EutecTrode 29 (ac), 290 (dc)			No. 61
E-Cu Al A	Airco 100				Ampco-Trode 10				EutecTrode 850 (dc)			
E-Cu Al B	Airco 116				Ampco-Trode 160							
E-Cu Al C	Airco 120				Ampco-Trode 200							
E-Cu Al D	Airco 125				Ampco-Trode 250							
E-Cu Al E	Airco 130				Ampco-Trode 300							

Armor Plate Arcwelding Electrodes

U. S. Spec. No.	Air Reduction Sales Co.	Alloy Rods Co.	Canadian Liquid Air Co.	Champion Rivet Co.	Eutectic Welding Alloys Co.	General Electric Co.	Harnischfeger Corp.	Hollup Corp.	Lincoln Electric Co.	McKay Co.	Mu Thers
		Armorarc C Lime ac-dc									
WD-EL 307	Airco 19-9 Mn Lime Type	Armorarc B (307 Lime)	Armorac B-Lime	Champion 307 B-1		W-1307	AW-3C	Armco 1	Shield-Arc LH 70-W	Armorloy A-8	
WD-ET 307	Airco 19 9 Mn Titania Type	Armorarc Mn ac-dc	Armorac MN-Titania	Champion 307 MN-2		W-2307	AW-3C-T	Armco 1 2 Mn			Murex Type 3
WD-ET 308	Airco 19 9 Mo Titania Type	Armorarc Mo ac-dc (308 Mo)	Armorac MO-Titania	Champion 308 MO-2	EutecTrode 70 (ac-dc)	W-2308 Mo	308 Mo-T	Armco 1 3 Mo		Armorloy A 9 Armorloy C	Murex Type 3
	Airco 394										

Nonferrous specifications (con

Spec. No.	Approximate composition	
AN-M-28	Mg, 6 Al, .7 Zn	Sh
AN-M-29	Mg, 3 Al, 1 Zn	Sh
AN-M-30	Mg, 1.5 Mn	Sh
AN-M-36-1	Mg alloys (3 grades)	Sa
AN-QQ-A-364	General spec. for Al alloys	Ca
AN-QQ-A-366 (13)	Al, 12 Si (13)	Di
AN-QQ-A-366 (13X)	Al, 12 Si (13X)	Di
AN-QQ-A-366 (85)	Al, 4 Cu, 5 Si (85)	Die
AN-QQ-A-366 (85X)	Al, 4 Cu, 6 Si (85X)	Die
AN-QQ-A-366 (218)	Al, 8 Mg (218)	Die
AN-QQ-A-376	Al, 5 Si, 1.5 Cu	Cas
AN-QQ-A-379	Al, 4 Cu, 1.5 Mg	Cas
AN-QQ-A-383	Al, 4-5 Cu, 2-3 Si (B195)	Per ca
AN-QQ-A-386	Al, 12 Si, 2.5 Ni, 1 Cu, 1 Mg (32)	Per ca
AN-QQ-A-390	Al, 4-5 Cu, 1.5 Si (195)	San
AN-QQ-A-392	Al, 10 Mg	San
AN-QQ-A-394	Al, 7 Si	San
AN-QQ-A-397	Al, 4 Cu, 3 Si	San
AN-QQ-A-399	Al, 7 Cu, 2 Si (212)	San
AN-QQ-A-402	Al, 3.8 Mg	San
AN-QQ-A-405	Al, 5 Si	Sand

These spe
cover details
The specifica
shown are ap
requirements.

Spec. No.	Approximate composition	
17B12	99.45 min Al	Bus b
17E4e	70 Ni, 23 Cu	Weldi
17W2 Gr A	Copper-nickel	Resist
17W2 Gr B	Copper-nickel	Resist
17W2 Gr C	Ni-Cr-Fe	Resist
17W2 Gr D	Ni-Cr-Fe	Resist
17W2 Gr E	Ni-Cr	Resist
17W2 Gr F	Al-Cr-Fe	Resist
22C5a	Bronze	Flex.
22W3c	Copper	Hard
22W5f	94 min Cu, 3.5 Sn, .5 P	Spring
22W9a	Copper	Soft w
33T3b Type 2	Al 1.2 Mn (3S)	Flex. t
33T3b Type 3	Al, 1.2 Mn (3S)	Flex. t
33T3 Type 2	Al, 2.5 Mg, .2 Cr (52S)	Flex. t
33T3 Type 3	Al, 2.5 Mg, .2 Cr (52S)	Flex. t
41G5 Gr A	70 Ni, 30 Cu	Rods,
41G5 Gr B	Ni, Cu, Al alloy	Bars, r
43R5e Gr A	99.0 min Al (2S)	Rivet v
43R5e Gr B	Al, 1.2 Mn (3S)	Rivet v
43R5e Gr C	Al, 4Cu (17S)	Wire, r
43R5e Gr D	Al, 4.5 Cu, 1.5 Mg (24)	Wire, r
43R5e Gr E	Al, 1.2 Mg, .3 Cr (53S)	Rivet v
43R5e Gr F	Al, 4.5 Cu (17S)	Rivet v
43R5e Gr G	Al, 5 Mg (56S)	Rivet v
44P2g	99.9 min copper	Seamle
44P12c Gr A	85 Cu, 15 Zn	Pipe
44P12c Gr B	66 Cu, .5 Pb, bal. Zn	Seamle
44T7f	72 Cu, 1 Sn, bal. Zn	Tubing
44T12c	99.9 min copper	Seamle
44T15b Gr 1	85 Cu, 15 Zn	Seamle
44T15b Gr 2	66 Cu, .5 Pb, bal. Zn	Seamle
44T16b	85 Cu, 15 Zn	Seamle
44T19b	99.0 min Al	Seamle
44T20a	Al, 1.2 Mn (3S)	Tubing
44T21d	Al, 4.5 Cu (17S)	Rod, tu

rt of comparable arcw

rosion Resisting Steel Arcwelding Electrodes

Eutectic Welding Alloys Corp.	General Electric Co.	Harnischfeger Corp.	Hobart Bros. Co.	Hollup Corp.	Lincoln Electric Co.	The McKay Co.	Marquette Mfg. Co.	Me Therm
Eutec-Staintrode B (dc)	W-1308	Harstain 18 8	No. 308	Sureweld 19 9	Stainweld A7, A5	McKay 18-8 dc Lime		Mure 19 9
Eutec-Staintrode B (ac-dc)	W 2308	Harstain A 18-8	No. 308 ac			McKay 18 8 ac-dc	No. 308	Mure Type
Eutec-Staintrode C (dc)	W-1309	Harstain 25-12	No. 309	Sureweld 25-12	Stainweld S-Cb	McKay 25-12 dc Lime		Mure 25-1
Eutec-Staintrode C (ac-dc)	W 2309	Harstain A 25 12	No. 309 ac			McKay 25-12 ac-dc		Mure Type
Eutec-Staintrode D (dc)	W-1310	Harstain 25 20	No. 310	Sureweld 25-20	Stainweld D	McKay 25-20 dc Lime		Mure 25-2
Eutec-Staintrode D (ac-dc)	W-2310	Harstain A 25 20	No. 310 ac			McKay 25-20 ac-dc		Mure Type
Eutec-Staintrode A (moly) (dc)	W-1316	Harstain 18 8 2 Mo	No. 316	Sureweld 19-9 Mo	Stainweld C-Cb	McKay 18-8 Mo (316) dc Lime		Mure 18-8
Eutec-Staintrode A (moly) (ac-dc)	W-2316	Harstain A 18 8 2 Mo	No. 316 ac			McKay 18-8 Mo (316) ac-dc		Mure Type
	W-1317	Harstain 18 9 3 Mo		Sureweld 19-9 Mo		McKay 18-8 Mo (317) dc Lime		Mure 18-8
	W-2317	Harstain A 18-8-3 Mo				McKay 18-8 Mo (317) ac-dc		Mure Type
	W-1330			Sureweld 15-35		McKay 15-35 dc Lime		
	W-2330					McKay 15-35 ac-dc		Mure Type
Eutec-Staintrode A (dc)	W-1347	Harstain 18-8 Cb	No. 347	Sureweld 19-9 Cb	Stainweld A7Cb, A5Cb	McKay 18-8 Cb dc Lime		Mure 19-9
Eutec-Staintrode A (ac-dc)	W 2347	Harstain A 18-8 Cb	No. 347 ac			McKay 18-8 Cb ac-dc		Mure Type
	W-1410					McKay 12 Cr dc Lime		
						McKay 12 Cr ac-dc		Mure Type
	W-1430					McKay 16 Cr dc Lime		
						McKay 16 Cr ac-dc		Mure Type
Eutectrode 6H	W-1502	Harchrome 5 Cr		Sureweld 4-6 Cr		McKay 5 Cr Mo dc Lime		Mure 4-6
						McKay 5 Cr Mo ac-dc		Mure Type

Copper Arcwelding Electrodes

American Agile Corp.	Ampco Metal, Inc.	Arcos Corp.	Canadian Liquid Air Co.	Champion Rivet Co.	Eutectic Welding Alloys Co.	General Electric Co.	Lincoln Electric Co.	Marquette Mfg. Co.	Metal & Thermit Corp.
					EutecTrode 30 (ac), 300 (dc)				Murex Type PB E Cu Sn
	Phoe-Trode	Bronzend P			EutecTrode 28 (ac), 280 (dc)	W-70			
Agile Bronze			Bronze Arc	Bronze Devil			Aeriswald		
		Nicuend							
	Sil-Trode	Bronzend E			EutecTrode 29 (ac), 290 (dc)			No. 61	Murex Type SB
	Ampco-Trode 10				EutecTrode 850 (dc)				Murex Type AB
	Ampco-Trode 160								Murex Type AB
	Ampco-Trode 200								Murex Type AB
	Ampco-Trode 250								Murex Type AB
	Ampco-Trode 300								Murex Type AB

Armor Plate Arcwelding Electrodes

Canadian Liquid Air Co.	Champion Rivet Co.	Eutectic Welding Alloys Co.	General Electric Co.	Harnischfeger Corp.	Hollup Corp.	Lincoln Electric Co.	McKay Co.	Metal & Thermit Corp.
			W-1307	AW-3C	Armorod 1	Shield-Arc LH 70-M	Armorloy A-8	
Armorac B-Lime	Champion 307 B-1		W-2307	AW-3C-T	Armorod 2 Mn			Murex Type 307 Mn-A
Armorac MN-Titania	Champion 307 MN-2	EutecTrode 70 (ac-dc)	W-2308 Mo	308 Mo-T	Armorod 3 Mo		Armorloy A 9	Murex Type 308 Mo-A
Armorac MO-Titania	Champion 308 MO-2						Armorloy C	

...rcwelding electrodes

...odes

Marquette Mfg. Co.	Metal & Thermit Corp.	Maurath Inc.	Page Steel & Wire	Reid-Avery Corp.	A. O. Smith Corp.	Universal Welder Corp.	Westinghouse Electric Corp.
	Murex 19-9	Maurath 18-8-S dc, Lime	Page-Allegheny 18-8	Racolloy 18-8	SW-162	Stainarc A	Flexarc 308 L
No. 308	Murex Type 308	Maurath 18-8-S, ac-dc	Page-Allegheny 18-8		SW-362		Flexarc 308 TL
	Murex 25-12	Maurath 309, ac-dc	Page-Allegheny 25-12	Racolloy 25-12	SW-166	Stainarc G	Flexarc 309L
	Murex Type 309	Maurath 309-CB	Page-Allegheny 25-12				Flexarc 309 TL
	Murex 25-20	Maurath 310, ac-dc	Page-Allegheny 25 20	Racolloy 25 20	SW-159	Stainarc J	Flexarc 310 L
	Murex Type 310	Maurath 316, ac-dc	Page-Allegheny 25 20		SW-359		Flexarc 310 TL
	Murex 18-8 Mo	Maurath 317	Page-Allegheny 18-8 Mo	Racolloy 18-12 (2-3 Mo)	SW-160	Stainarc C	Flexarc 316 L
	Murex Type 316	Maurath 318	Page-Allegheny 18-8 Mo				
	Murex 18-8 Mo	Maurath 329	Page-Allegheny 18-8 HMo	Racolloy 18-12 (3-4 Mo)	SW-161	Stainarc D	Flexarc 317 L
	Murex Type 317	Maurath 330	Page-Allegheny 18-8 HMo				Flexarc 317 TL
		Maurath 347	Page-Allegheny 15-35	Racolloy 330		Stainarc U	Flexarc 330 L
	Murex Type 316	Maurath 410	Page-Allegheny 15-35				
	Murex 19-9 Cb	Maurath 442	Page-Allegheny 18-8 Cb	Racolloy 18-8 Cb	SW-157	Stainarc B	Flexarc 347 L
	Murex Type 347	Maurath 443	Page-Allegheny 18-8 Cb		SW-357		Flexarc 347 TL
		Maurath 446	Page-Allegheny 12 Pct Cr	Racolloy 410	SW-153	Stainarc M	Flexarc 410 L
	Murex Type 410	Maurath 502	Page Allegheny 12 Pct Cr				
		Maurath 20	Page-Allegheny 16 Pct Cr	Racolloy 430	SW-154	Stainarc N	Flexarc 430 L
	Murex Type 430	Maurath 16-25-6	Page Allegheny 16 Pct Cr				
	Murex 4-6 Chrome		Page Allegheny 4-6 Cr Mo	Racolloy 502	SW-151	Stainarc Y	Flexarc 502 L
	Murex Type 502		Page Allegheny 4-6 Cr Mo				

...rquette ...g. Co.	Metal & Thermit Corp.	C. E. Phillips & Co.	Reid-Avery Co.
	Murex Type PB-57 E Cu Sn A	Crucible Arc No. 85	Racolloy Phosphor Bronze
		Crucible Arc No. 60	
61	Murex Type SB-80		
	Murex Type AB-12		
	Murex Type AB-16		
	Murex Type AB-20		
	Murex Type AB-25		
	Murex Type AB-30		

	Metal & Thermit Corp.	Page Steel & Wire	Reid-Avery Co.
		Page Armor Welding Rod	Racolloy 307
	Murex Type 307 Mn-A	Page Armor Welding Rod	Racolloy 25 20
	Murex Type 308 Mo-A	Page Armor Welding Rod	

...te ...n	Form	Similar to ASTM
	Refined ingots	B216-49
	Shapes	B122-49T Gr 5
	Castings	
...5 Co	Precision castings	
...i,	Castings	
...Fe	Castings	
...Cu	Ingots, castings	B23-49 Gr 1 B102-48 Gr 1
...Cu	Ingots, castings	B23-49 Gr 2
...Cu	Ingots, castings	B23-49 Gr 3
...Cu	Ingots, castings	B102-49 Gr 2
	Castings	B145-49 Gr 4A
...Zn	Castings	B143-49 Gr 1B B30-49 Gr 1B
...e,	Castings	B164-49T Cl A
...e,	Castings	B164-49T Cl B
...sium	Castings, ingots, sticks	B92-45
	Die castings	B91-49T-AS100
	Forgings	B91-49T-AZ61A
	Forgings	B91-49T-AZ80A
	Forgings	B107-49T-MIA
	Forgings	B91-49T-AZ31B
	Forgings	B91-49T-TA54A
	Rods	
	Rods, bars	
...In, Cu	Castings	
...In, Cu	Castings	
	Welding rod	
	Welding rod	B184-43T
	Welding rod	B26-48T-C4A
	Welding rod	B164-49T Cl A
	Welding rod	
	Welding rod	
...l. Zn	Welding rod	B21-49T Gr A
...l. Zn	Welding rod	B21-49T Gr A
	Welding rod	B225-48T GrECu
	Welding rod	B24-46 Gr 9930
	Welding rod	B26-48T-C4A
...le	Welding rod	
...Fe	Welding rods	B166-49T
...7 Zn	Shapes	B151-49T Gr A
...Ni,	Shapes	B151-49T Gr C
...5 Zn	Various	Brazing alloy B73-29 Gr 4
...5 Zn	Various	Brazing alloy B73-29 Gr 6
...5 Zn,	Various	Brazing alloy
...5 Zn,	Various	Brazing alloy
	Wire, solder	B32-49 Gr 50A
	Various, solder	B32-49T Gr 45A
	Various solder	B32-49T Gr 40A
...Sb	Various solder	B32-49T Gr 35B
...Sn	Various solder	B32-49T Gr 30A
	Various solder	B32-49T Gr 70A
	Braze solder	B64-43 Gr 50-50
...l. Zn	Braze solder	
	Braze solder	B134-49 Gr 6
	Braze solder	B134-49 Gr 4
...ain Sn	Wire, solder, flux core	
	Wire, solder	B32-49 Gr 40A
...ain Sn	Wire, solder, flux core	
	Various, solder	
	Various, solder	
	Pigs	
	Pigs	
	Slabs	B6-49 Gr 1
	Slabs	B6-49 Gr 2
	Slabs	B6-49 Gr 3
	Slabs	B6-49 Gr 4
	Slabs	B6-49 Gr 5
	Die castings	B86-48 Gr XXIII
	Die castings	B86-48 Gr XXV
	Sheet, strip	B209-49T Gr 990A

The Iron Age chart of

Mild Ste

Spec. No.	ASTM-AWS Specification No.	Electrode Coating	Welding Position	Air Reduction Sales Co.	Alloy Rods Co.	American Agile Corp.	Arcos Corp.	Canadian Liquid Air Co.	Champion Rivet Co.	Eutectic Welding Alloys Corp.	Gene Electri
AN-M-28	E-4510	Sulcoated or Light Coated	F, V, OH, H	Airco 41, 63				SC 15	Processed Sulcoat Speed #44		F, L
AN-M-29	E-4520	Sulcoated or Light Coated	H-Fillets, F					Type A			W-4, W 10
AN-M-30	E-6010	High Cellulose Sodium	F, V, OH, H	Airco 78, 78E	Weld Arc Type 6010	Agile White		LA Type 6010	Blue Devil	Steel-Tectic	W 22 W 22
AN-M-36-1	E-6011	High Cellulose Potassium	F, V, OH, H	Airco 230	Weld Arc Type 6011	Agile Blue		LA Type 6011	Bluedac	Steel-Tectic	W 26
AN-QQ-A-364	E-6012	High Titania Sodium	F, V, OH, H	Airco 87, 323 387	Weld Arc Type 6012	Agile Red-White		LA Type 6012	Gray Devil Gray Devil #2 Gray Devil HP	Steel-Tectic	W 20, W 29
AN-QQ-A-366 (13)	E-6013	High Titania Potassium	F, V, OH, H	Airco 90, 90-A	Weld Arc Type 6013	Agile Blue-Red, Brown		LA Type 6013	Graydac Tan Devil	EutecTrodes 60 (ac), 600 (dc), 6000 (ac-dc)	W-25
AN-QQ-A-366 (13X)	E-6015	Low Hydrogen Sodium	F, V, OH, H		Weld Arc Type 7015	Agile FMS		HFD		EutecTrode 660 (dc)	
AN-QQ-A-366 (85)	E-6016	Low Hydrogen Potassium	F, V, OH, H	Airco 312	Weld Arc Type 7016	Agile FMS-AC	Tensilend 70	HFA	Hy-Lo		W 32
AN-QQ-A-366 (85X)	E-6020	High Iron Oxide	H-Fillets, F	Airco 81, 315	Weld Arc Type 6020	Agile Blue-Grey		LA Type 6020	Black Devil		W-24, W 27
AN-QQ-A-366 (218)	E-6030	High Iron Oxide	F			Agile White-Grey			Red Devil		
AN-QQ-A-376											
AN-QQ-A-379											
AN-QQ-A-383											
AN-QQ-A-386											
AN-QQ-A-390											
AN-QQ-A-392											
AN-QQ-A-394											
AN-QQ-A-397											
AN-QQ-A-399											
AN-QQ-A-402											
AN-QQ-A-405											

Low Alloy

Spec. No.	ASTM-AWS Specification No.	Electrode Coating	Welding Position	Air Reduction Sales Co.	Alloy Rods Co.	Arcos Corp.	Canadian Liquid Air Co.	Champion Rivet Co.	Eutectic Welding Alloys Co.	General Electric Co.
17B12	E-7010	High Cellulose Sodium	F, V, OH, H	Airco 93	Weld Arc Type 7010			Blue Devil 85		W-62
17E4e	E-7011	High Cellulose Potassium	F, V, OH, H	Airco 382	Weld Arc Type 7011				EutecTrode 66 (ac)	W-56
17W2 Gr A	E-7015	Low Hydrogen Sodium	F, V, OH, H		Weld Arc Type 7015		HFD			
17W2 Gr B	E-7016	Low Hydrogen Potassium	F, V, OH, H	Airco 327, 396	Weld Arc Type 7016	Tensilend 70, 70N	HFA	Hy-Lo		W-2180
17W2 Gr C	E-7020	High Iron Oxide	H-Fillets, F	Airco 94	Weld Arc Type 7020			Black Devil 75		W-54
17W2 Gr D	E-8015	Low Hydrogen Sodium	F, V, OH, H		Weld Arc Type 2315	Chromend 1M Nickend 2				
17W2 Gr E	E-8016	Low Hydrogen Potassium	F, V, OH, H	Airco 398	Weld Arc Type 2316			Chromoloy 8016		W-62
17W2 Gr F	E-9015	Low Hydrogen Sodium	F, V, OH, H		Weld Arc Type 9015	Chromend 2M				
22C5a	E-9016	Low Hydrogen Potassium	F, V, OH, H	Airco 351, 354	Weld Arc Type 9016	Manganend 1M		Chromoloy 9016		W-68
22W3c	E-10013	High Titania Potassium	F, V, OH, H					Chromoloy 10013	EutecTrode 71 (ac-dc)	W-55
22W5f	E-10015	Low Hydrogen Sodium	F, V, OH, H		Weld Arc Type 10015					
22W9a	E-10016	Low Hydrogen Potassium	F, V, OH, H	Airco 394, 395, 397	Weld Arc Type 10016	Manganend 2M Tensilend 100		Chromoloy 10016		W-65
33T3b Type 2										
33T3b Type 3										
33T3 Type 2										
33T3 Type 3										
41G5 Gr A										
41G5 Gr B										
43R5e Gr A										
43R5e Gr B										
43R5e Gr C										
43R5e Gr D										
43R5e Gr E										
43R5e Gr F										
43R5e Gr G										
44P2g										
44P12c Gr A										
44P12c Gr B										
44T7f										
44T12c										
44T15b Gr 1										
44T15b Gr 2										
44T16b										
44T19b										
44T20a										
44T21d										

Aluminu

AISI-AWS Specification No.	Air Reduction Sales Co.	All-State Welding Alloys Co.	American Agile Corp.	C Li
Al-2				
Al-43	Airco 57	All-State No. 32	Agile Aluminum 5 Pct Si	LA Al

rt of comparable arcwelding

Mild Steel Arcwelding Electrodes

tectic ng Alloys orp.	General Electric Co.	Harnischfeger Corp.	Hobart Bros. Co.	Hollup Corp.	Lincoln Electric Co.	McKay Co.	Marquette Mfg. Co.	M
	F, L	Washcote	Sulkote	Type 30-S	Stable-Arc	McKay 21	No. 101	
	W-4, W 1049			Type 30-XL		McKay 3		
ctic	W 22 W 22S	AP, APV	No. 10, No. 55	Sureweld B, BP	Fleetweld 5, Lightweld	McKay 15, 15-D	No. 105	
ctic	W 26	AC-1	No. 335	Sureweld CB	Fleetweld 35	McKay 11	No. 130, No. 140	
ctic	W 20, W-28, W 29	PF, PFA	No. 12, No. 77	Sureweld N, NM, G, LG	Fleetweld 7, 72	McKay 17, 116	No. 120	
odes 600 (dc), c-dc)	W-25	AC-3, SM	No. 13, No. 313, No. 447	Sureweld CN, UE	Fleetweld 37, 47 Planeweld 2	McKay 2 4	No. 151	
ode		70 LA	70-PL			Puralloy 70		
	W 32	70 LA-2	No. 16		Shield-Arc LH70			
	W-24, W 27	DH-2	No. 111	Sureweld FD	Fleetweld 11	McKay 16	No. 115	
				Sureweld A		McKay 18		

Alloy Steel Arcwelding Electrodes

t'c ng Co.	General Electric Co.	Harnischfeger Corp.	Hobart Bros. Corp.	Hollup Corp.	Lincoln Electric Co.	McKay Co.	Marquette Mfg. Co.	Metal & Thermit Corp.
	W-52	CM-50	No. 885	Sureweld MLY-50	Shield Arc 85	McKay 715		Murex Molex
ode	W-56	CM-50-1		Sureweld MLY-C		McKay 711		Murex Type MA
		70-LA				Puralloy 80		
	W-2180	70-LA-2		Sureweld 7016	Shield Arc LH-70			
	W-54	CM-50-2	No. 111-HT	Sureweld MLY-A	Fleetweld 11-HT	McKay 716		Murex Type DM
		75 LP, 80-LE	90-PL			Puralloy 90		
	W-62			Sureweld 8016				Murex Type 8016-Q
		90-LE, 40-C, AW 2-B				Puralloy 100		
	W-68	P & H #7		Sureweld 9016				Murex Type 2116
ode dc)	W-55	AW-4			Planeweld 1		No. 110	
						Puralloy 110		
	W-65	90-LH-2, P & H #12		Sureweld 10016				Murex, Type AWL, 4216

Aluminum Arcwelding Electrodes

American Agile Corp.	Canadian Liquid Air Co.	Champion Rivet Co.	Eutectic Welding Alloys Corp.	Hobart Bros. Co.	Hollup Corp.	Lincoln Electric Co.	Marquette Mfg. Co.	Universal Welder Corp.
			EutecTrode 2102 (dc)	"Hobart" Aluminum				Luminaire 23
Agile Aluminum 5 Pct Si	LA Aluminum	Type E-43	EutecTrode 2100 (dc)		Sureweld 1217-C	Aluminweld	No. 70	Luminaire 5S

Approximate composition	Form	Similar to ASTM
min Cu	Refined ingots	BZ16-49
, 30 Ni	Shapes	B122-49T Gr 5
, 30 Ni	Castings	
.5-2 Be, .25 Co	Precision castings	
Cu, 20 Ni, , 10 Zn	Castings	
, 23 Cu, 3 Fe	Castings	
, 4 Sb, 4 Cu	Ingots, castings	B23-49 Gr 1 B102-48 Gr 1
, 8 Sb, 4 Cu	Ingots, castings	B23-49 Gr 2
, 8 Sb, 8 Cu	Ingots, castings	B23-49 Gr 3
, 13 Sb, 5 Cu	Ingots, castings	B102-49 Gr 2
, 15 Zn	Castings	B145-49 Gr 4A
, 10 Sn, 2 Zn	Castings	B143-49 Gr 1B B30-49 Gr 1B
Ni, 2.5 Fe, n, bal. Cu	Castings	B164-49T Cl A
Ni, 2.5 Fe, n, bal. Cu	Castings	B164-49T Cl B
min magnesium	Castings, ingots, sticks	B92-45
10 Al	Die castings	B91-49T-AS100
3 Al, 1 Zn	Forgings	B91-49T-AZ61A
0 Al	Forgings	B91-49T-AZ80A
Mn	Forgings	B107-49T-MIA
Al, 3 Zn	Forgings	B91-49T-AZ31B
Al, 5 Sn	Forgings	B91-49T-TA54A
i alloy	Rods	
alloy	Rods, bars	
, 4 Si, 1 Mn, Cu	Castings	
, 5 Si, 1 Mn, Cu	Castings	
, 40 Zn	Welding rod	
min Al	Welding rod	B184-43T
Si	Welding rod	B26-48T-C4A
, 30 Cu	Welding rod	B164-49T Cl A
, bal. Cu	Welding rod	
-11 Sn, P	Welding rod	
u, 1 Sn, bal. Zn	Welding rod	B21-49T Gr A
u, 1 Sn, bal. Zn	Welding rod	B21-49T Gr A
min Cu	Welding rod	B225-48T GrECu
min Al	Welding rod	B24-46 Gr 9930
Si	Welding rod	B26-48T-C4A
gsten carbide	Welding rod	
l, 15 Cr, 9 Fe	Welding rods	B166-49T
u, 18 Ni, 17 Zn	Shapes	B151-49T Gr A
u, 1 Pb, 18 Ni, . Zn	Shapes	B151-49T Gr C
g, 30 Cu, 25 Zn	Various	Brazing alloy B73-29 Gr 4
g, 20 Cu, 15 Zn	Various	Brazing alloy B73-29 Gr 6
g, 15 Cu, 15 Zn, Cd	Various	Brazing alloy
g, 15 Cu, 16 Zn, Cd, 3 Ni	Various	Brazing alloy
b, 49 Sn	Wire, solder	B32-49 Gr 50A
b, 44 Sn	Various, solder	B32-49T Gr 45A
b, 38 Sn	Various solder	B32-49T Gr 40A
b, 35 Sn, 1 Sb	Various solder	B32-49T Gr 35B
b, 30 min Sn	Various solder	B32-49T Gr 30A
b, 70 Sn	Various solder	B32-49T Gr 70A
u, 50 Zn	Braze solder	B64-43 Gr 50-50
u, 4 Sn, bal. Zn	Braze solder	
u, 30 Zn	Braze solder	B134-49 Gr 6
u, 20 Zn	Braze solder	B134-49 Gr 4
min Pb, 48 min Sn	Wire, solder, flux core	
b, 40 Sn	Wire, solder	B32-49 Gr 40A
min Pb, 37 min Sn	Wire, solder, flux core	
n, 6 Sb	Various, solder	
b, 5 Ag	Various, solder	
5 min Tin	Pigs	
min Tin	Pigs	
5 min Zinc	Slabs	B6-49 Gr 1
	Slabs	B6-49 Gr 2
	Slabs	B6-49 Gr 3
(8 max Pb)	Slabs	B6-49 Gr 4
(1 max Pb)	Slabs	B6-49 Gr 5
4 Al	Die castings	B86-48 Gr XXIII
4 Al, 1 Cu	Die castings	B86-48 Gr XXV
min Al	Sheet, strip	B209-49T Gr 990A

chart of comparable arcwelding electrodes (continued)

Mild Steel Arcwelding Electrodes

Champion Rivet Co.	Eutectic Welding Alloys Corp.	General Electric Co.	Harnischfeger Corp.	Hobart Bros. Co.	Hollup Corp.	Lincoln Electric Co.	McKay Co.	Marquette Mfg. Co.	Metal & Thermit Corp.	Page Steel & Wire	Reid-Avery Co.	A. O. Smith Corp.	Steel Co. of Canada	Universal Welder Corp.	Westinghouse Electric Corp.
Processed Sulcoat Speed #44		F, L	Washcote	Sulkote	Type 30-S	Stable-Arc	McKay 21	No. 101		Page B bare	Blue Label		Stoico Electrod No. 4 bare, No. 4 FCW	Staldarc B-11	Sulcoat Grade 18
		W-4, W 1049			Type 30-XL		McKay 3				D, M-9 Knurled			Staldarc G-11	
Blue Devil	Steel-Tectic	W 22 W 22S	AP, APV	No. 10, No. 55	Sureweld B, BP	Fleetweld 5, Lightweld	McKay 15, 15-D	No. 105	Murex Type R		Raco 7	SW-10	Stoico Electrod No. 704, 704D	Hevicoat RP Easyweld BL-10	Flexarc AP
Bluedar	Steel-Tectic	W 26	AC-1	No. 335	Sureweld CB	Fleetweld 35	McKay 11	No. 130, No. 140	Murex Type A		Raco 11	SW-14	Stoico Electrod No. 501	Hevicoat AC-11 Easyweld BL-11	Flexarc ACP
Gray Devil Gray Devil #2 Gray Devil HP	Steel-Tectic	W 20, W-28, W 29	PF, PFA	No. 12, No. 77	Sureweld N, NM, G, LG	Fleetweld 7, 72	McKay 17, 116	No. 120	Murex Genex, Genex M		Raco 8	SW 11, SW 17	Stoico Electrod No. 604	Hevicoat SP 2 Easyweld RW-12	Flexarc FP, FP-2
Graydar Tan Devil	EutecTrodes 60 (ac), 600 (dc), 6000 (ac-dc)	W-25	AC-3, SM	No. 13, No. 313, No. 447	Sureweld CN, UE	Fleetweld 37, 47 Planeweld 2	McKay 2 4	No. 151	Murex Alternex, Type U	Page Hi-Tensile G	Raco 13A, 13B	SW-15, SW-16	Stoico Electrod No. 404	Hevicoat AC-13 Easyweld BR-13	Flexarc SW, SW-2
	EutecTrode 660 (dc)		70 LA	70 PL			Pluralloy 70			Page Hi-Tensile M	Raco 180-15			Hevicoat LH Easyweld FMS-15	
Hy-Lo		W 32	70 LA-2	No. 16		Shield-Arc LH70			Murex Type HTS		Raco 180 16	SW 64		Easyweld FMS-16	Flexarc LOH-2
Black Devil		W-24, W 27	DH-2	No. 111	Sureweld FD	Fleetweld 11	McKay 16	No. 115	Murex Type FHP		Raco 20	SW 35	Stoico Electrod No. 804	Hevicoat FF Easyweld BG 20	Flexarc DH
Red Devil					Sureweld A		McKay 18		Murex Type D		Raco 5	SW 20, SW 25	Stoico Electrod No. 904	Easyweld WB-30	

Low Alloy Steel Arcwelding Electrodes

Champion Rivet Co.	Eutectic Welding Alloys Co.	General Electric Co.	Harnischfeger Corp.	Hobart Bros. Corp.	Hollup Corp.	Lincoln Electric Co.	McKay Co.	Marquette Mfg. Co.	Metal & Thermit Corp.	Page Steel & Wire	Reid-Avery Co.	A. O. Smith Corp.	Steel Co. of Canada	Universal Welder Corp.	Westinghouse Electric Corp.
Blue Devil 85		W-52	CM-50	No. 885	Sureweld MLY-50	Shield Arc 85	McKay 715		Murex Molex		Raco 74	SW 75, SW 80	Stoico Electrod No. 710	Hevicoat HT-10	Flexarc AP-MO
	EutecTrode 66 (ac)	W-56	CM-50-1		Sureweld MLY-C		McKay 711		Murex Type MA						Flexarc ACP-MO
			70-LA				Pluralloy 80			Page Hi-Tensile M	Raco 180 15				
Hy-Lo		W-2180	70-LA-2		Sureweld 7016	Shield Arc LH-70					Raco 180-16	SW 64			Flexarc LOH 2
Black Devil 75		W-54	CM-50-2	No. 111-HT	Sureweld MLY-A	Fleetweld 11-HT	McKay 716		Murex Type DM		Raco 64	SW 76, SW-78	Stoico Electrod No. 720	Hevicoat HT-20	Flexarc DH-MO
			75 LP, 80-LE	90-PL			Pluralloy 90				Raco ½ Cr-½ Mo				
Chromoloy 8016		W-62			Sureweld 8016				Murex Type 8016-Q			SW 90			
			90-LE, 40-C, AW 2-B				Pluralloy 100				Raco 1¾ Cr-1 Mo				
Chromoloy 9016		W-68	P & H #7		Sureweld 9016				Murex Type 2116			SW-99			
Chromoloy 10013	EutecTrode 71 (ac-dc)	W 55	AW-4			Planeweld 1		No. 110			Raco 10013	SW-88			
							Pluralloy 110				Raco 230-15				
Chromoloy 10016		W-65	90-LH-2, P & H #12		Sureweld 10016				Murex, Type AWL, 4216			SW-103			

Aluminum Arcwelding Electrodes

Air Reduction Sales Co.	All-State Welding Alloys Co.	American Agile Corp.	Canadian Liquid Air Co.	Champion Rivet Co.	Eutectic Welding Alloys Corp.	Hobart Bros. Co.	Hollup Corp.	Lincoln Electric Co.	Marquette Mfg. Co.	Universal Welder Corp.
					EutecTrode 2102 (dc)	"Hobart" Aluminum				Luminaire 2S
Airco 57	All-State No. 32	Agile Aluminum 5 Pct Si	LA Aluminum	Type E-43	EutecTrode 2100 (dc)		Sureweld 1217-C	Aluminweld	No. 70	Luminaire 5S

Nonferrous specifications (continued)

Spec. No.	Approximate composition	Form	Similar to ASTM
46A6e	Al, 1.2 Mn (3S)	Wrought	B209-49T-MIA
46A7d Gr 1	Al, 4.5 Cu (17S)	Forgings	B211-49T-CM41A
46A7d Gr 2	Al, 4.5 Cu, 1 Si (25S)	Forgings	B211-49T-CM41B
46A7d Gr 3	Al, 1 Si (A51)	Forgings	B211-49T
46A7d Gr 5	Al, 1 Si, 4 Cu, 1 Mn (14S)	Forgings	B211-49T-C541A
46A7d Gr 6	Al, 12 Si, 1 Cu, 1 Mg (32S)	Forgings	Alloy 32S
46A7d Gr 7	Al, 4 Cu, 2 Ni, 1 Si (18S)	Forgings	Alloy 18S
46A7d Gr 8	Al, 1.2 Mg, 3 Cr (53S)	Forgings	B211-49T-GS11B
46A9d	Al, 4.5 Cu, 1.5 Mg (24S)	Wrought	B211-49T-CG42A
46A10a	Al, 1.2 Mg (53S)	Wrought	B211-49T-GS11A
46A11	Al, 2.5 Mg, .2 Cr (52S)	Bars, rods	B211-49T-GR20A
46A14 Cl 1	Al, 12 Si	Die castings	B85-49T-S5
46A14 Cl 2	Al, 12 Si	Die castings	B85-49T-SN122A
46A14 Cl 3	Al, 5 Si	Die castings	B85-49T-S4
46A14 Cl 4	Al, 3 Si, 4 Cu	Die castings	B179-49T-CS72A
46A14 Cl 5	Al, 5 Si, 4 Cu	Die castings	B179-49T-SC64A
46A14 Cl 6	Al, 3 Cu, 3 Ni	Die castings	B85-49T-CN42A
46A14 Cl 7	Al, 8 Mg	Die castings	B85-49T-G2
46A14 Cl 8	Al, 7 Si	Die castings	B179-49T-SG70A
46A15 Cl 1	Al, 7 Cu	Perm. mold castings	B108-49T-CS72A
46A15 Cl 2	Al, 10 Cu	Perm. mold castings	B108-49T-CS104A
46A15 Cl 3	Al, 4 Cu, 2 Ni	Perm. mold castings	B108-49T-CN42A
46A15 Cl 4	Al, 5 Cu, 3 Si	Perm. mold castings	B108-49T-CS42A
46A15 Cl 5	Al, 5 Cu, 5 Si	Perm. mold castings	B108-49T-SC64A
46A15 Cl 6	Al, 1 Cu, 5 Si	Perm. mold castings	B108-49T-SC51A
46A15 Cl 7	Al, 5 Si	Perm. mold castings	B108-49T-S5A
46A15 Cl 8	Al, 7 Si	Perm. mold castings	B108-49T-SG70A
46A15 Cl 9	Al, 12 Si, 2 Ni	Perm. mold castings	B108-49T-SN122A
46A15 Cl 10	Al, 12 Si	Perm. mold castings	B108-49T-SC122A
46B5i	88 Cu, 10 Sn, 1 Pb	Castings	B43-49 Gr 1A
46B6	60 Cu, 1 Sn, bal. Zn	Castings	B21-49T Gr A
46B8i	88 Cu, 6 Sn, 2 Pb	Castings	B143-49 Cl 2A B61-49 B30-49 Gr 2A
46B9d	83 Cu, 4 Zn, 13 Sn	Castings	
46B10h	63 Cu, 1 Sn, 1 Pb, bal. Zn	Castings	B132-49
46B11h	65 Cu, 2.5 Pb, 1 Sn, bal. Zn	Castings	B146-49 Gr 6B
46B14e	94 min Cu, 3.5 Sn, .5 P	Shapes	B100-49 Gr 1
46B15e	57-60 Cu, 1 Sn, .5 Mn, bal. Zn	Shapes	B138-49 Gr A B124-49 Gr 4
46B15e Gr B	63-68 Cu, 3 Fe, 2.5-5 Mn, 3-6 Al, bal. Zn	Shapes	B138-49 Gr B B124-49 Gr 6
46B16b	63-68 Cu, 3 Fe, 2.5-5 Mn, 3-6 Al, bal. Zn	Ingots	B30-49 Gr 7A
46B17b Gr A	95 Cu, 5 Al	Shapes	B124-49 Gr 10
46B17b Gr B	88 Cu, 8 Al, 4 Fe	Shapes	B150-49T Gr 1
46B18d	88 Cu, 8 Al, 4 Fe	Castings	B148-49 Gr 9A
46B19a	88 Cu, 8 Al, 4 Fe	Ingots	B148-49 Gr 9A B30-49 Gr 9A
46B21d	80 Cu, 12 Zn, 7 Sn, 2 Pb	Castings	
46B22g Gr 1	75 Cu, 6 Sn, 17 Pb	Castings	B144-49 Gr 3D
46B22g Gr 2	84 Cu, 8Sn, 8 Pb	Castings	B144-49 Gr 3A
46B22g Gr 3	85 Cu, 14 Sn, 1 Zn	Castings	B22-49 Gr B
46B22g Gr 4	81 Cu, 19 Sn	Castings	B30-49 Gr A
46B22g Gr 5	70 Cu, 5 Sn, 25 Pb	Castings	B30-49 Gr 3E
46B22g Gr 6	87 Cu, 5 Sn, 5 Ni	Castings	
46B23e	85 Cu, 5 Sn, 5 Pb, 5 Zn	Castings	B62-49 B30-49 Gr 4A
46B24e	80-84 Cu, 3 Sn, 10 Zn, 6 Pb	Castings	B62-49
46B26a	60 Cu, 1 Sn, bal. Zn	Rods	B21-49T Gr A
46B27a	Cu, 1-5 Si, 5 max Zn	Shapes, bars, sheets	
46B28a Cl A	Cu, 1-5.5 Si, 15 max Zn	Castings	
46B28a Cl B	Cu, 1-5 Si, 5 max Zn	Castings	
46B29b	60-68 Cu, 32-40 Zn	Sand casting	B30-49 Gr 8B
46B33	Al bronze	Heat treated forgings	
46B35	Naval brass	Die castings	
46C3c Gr A	99.6 min Cu plus P (12% P)	Ingots	B52-48 Gr A
46C3c Gr B	99.6 min Cu plus P (10% P)	Ingots	B52-48 Gr B
46C5d Gr A	99.88 min Cu (Lake or Electric)	Ingots	B4-41
46C5d Gr B	99.75 min Cu	Refined ingots	B216-49
46C6c	70 Cu, 30 Ni	Shapes	B122-49T Gr 5
46C8a	70 Cu, 30 Ni	Castings	
46C11a	Cu, 1.5-2 Be, .25 Co	Precision castings	
46C12	63-67 Cu, 20 Ni, 3 Sn, 10 Zn	Castings	
46M1g	60 Ni, 23 Cu, 3 Fe	Castings	
46M2f Gr 1	92 Sn, 4 Sb, 4 Cu	Ingots, castings	B23-49 Gr 1 B102-48 Gr 1
46M2f Gr 2	88 Sn, 8 Sb, 4 Cu	Ingots, castings	B23-49 Gr 2
46M2f Gr 3	84 Sn, 8 Sb, 8 Cu	Ingots, castings	B23-49 Gr 3
46M2f Gr 4	81 Sn, 13 Sb, 5 Cu	Ingots, castings	B102-49 Gr 2
46M4e	85 Cu, 15 Zn	Castings	B145-49 Gr 4A
46M6i	88 Cu, 10 Sn, 2 Zn	Castings	B143-49 Gr 1B B30-49 Gr 1B
46M7g Cl A	63-70 Ni, 2.5 Fe, 2 Mn, bal. Cu	Castings	B164-49T Cl A
46M7g Cl B	63-70 Ni, 2.5 Fe, 2 Mn, bal. Cu	Castings	B164-49T Cl B
46M10	99.8 min magnesium	Castings, ingots, sticks	B92-45
46M11	Mg, 10 Al	Die castings	B91-49T-AS100
46M13 Al 8	Mg, 6 Al, 1 Zn	Forgings	B91-49T-AZ61A
46M13 Al 9	Mg, 9 Al	Forgings	B91-49T-AZ80A
46M13 Al 11	Mg, 1 Mn	Forgings	B107-49T-MIA
46M13 Al 13	Mg, 3 Al, 3 Zn	Forgings	B91-49T-AZ31B
46M13 Al 16	Mg, 4 Al, 5 Sn	Forgings	B91-49T-TA54A
46N3	Mn-Ni alloy	Rods	
46N4c	Ni-Cr alloy	Rods, bars	
46N7 Cl A	65 Ni, 4 Si, 1 Mn, Cu	Castings	
46N7 Cl B	65 Ni, 5 Si, 1 Mn, Cu	Castings	
46R1 Cl 1, Type A	60 Cu, 40 Zn	Welding rod	
46R1 Cl 1, Type D	99.0 min Al	Welding rod	B184-43T
46R1 Cl 1, Type E	Al, 5 Si	Welding rod	B26-48T-C4A
46R1 Cl 1, Type F	70 Ni, 30 Cu	Welding rod	B164-49T Cl A
46R1 Cl 1, Type G	30 Ni, bal. Cu	Welding rod	
46R1 Cl 2, Type B	Cu, 4-11 Sn, P	Welding rod	
46R1b Type A	60 Cu, 1 Sn, bal. Zn	Welding rod	B21-49T Gr A
46R1b Type B	60 Cu, 1 Sn, bal. Zn	Welding rod	B21-49T Gr A
46R1b Type C	99.75 min Cu	Welding rod	B225-48T GrECu
46R1b Type D	99.0 min Al	Welding rod	B24-46 Gr 9930
46R1b Type E	Al, 5 Si	Welding rod	B26-48T-C4A
46R3c	Tungsten carbide	Welding rod	
46R6	75 Ni, 15 Cr, 9 Fe	Welding rods	B166-49T
46S3d Gr A	65 Cu, 18 Ni, 17 Zn	Shapes	B151-49T Gr A
46S3d Gr B	65 Cu, 1 Pb, 18 Ni, bal. Zn	Shapes	B151-49T Gr C
46S13 Gr 1	45 Ag, 30 Cu, 25 Zn	Various	Brazing alloy B73-29 Gr 4
46S13 Gr 2	65 Ag, 20 Cu, 15 Zn	Various	Brazing alloy B73-29 Gr 6
46S13 Gr 4	50 Ag, 15 Cu, 15 Zn, 19 Cd	Various	Brazing alloy
46S13 Gr 5	50 Ag, 15 Cu, 16 Zn, 16 Cd, 3 Ni	Various	Brazing alloy
46S14a Gr A	51 Pb, 49 Sn	Wire, solder	B32-49 Gr 50A
46S14a Gr B	56 Pb, 44 Sn	Various, solder	B32-49T Gr 45A
46S14a Gr C	62 Pb, 38 Sn	Various solder	B32-49T Gr 40A
46S14a Gr D	64 Pb, 35 Sn, 1 Sb	Various solder	B32-49T Gr 35B
46S14a Gr E	68 Pb, 30 min Sn	Various solder	B32-49T Gr 30A
46S14a Gr F	30 Pb, 70 Sn	Various solder	B32-49T Gr 70A
46S15a Gr A	50 Cu, 50 Zn	Braze solder	B64-43 Gr 50-50
46S15a Gr B	50 Cu, 4 Sn, bal. Zn	Braze solder	
46S15a Gr C	70 Cu, 30 Zn	Braze solder	B134-49 Gr 6
46S15a Gr D	80 Cu, 20 Zn	Braze solder	B134-49 Gr 4
46S20 Gr A	48 min Pb, 48 min Sn	Wire, solder, flux core	
46S20 Gr B	60 Pb, 40 Sn	Wire, solder	B32-49 Gr 40A
46S20 Gr C	57 min Pb, 37 min Sn	Wire, solder, flux core	
46S38	94 Sn, 6 Sb	Various, solder	
46S42	95 Pb, 5 Ag	Various, solder	
46Tld Gr A	99.75 min Tin	Pigs	
46Tld Gr B	98.0 min Tin	Pigs	
46Zla Gr A	99.75 min Zinc	Slabs	B6-49 Gr 1
46Zla Gr B	Zinc	Slabs	B6-49 Gr 2
46Zla Gr C	Zinc	Slabs	B6-49 Gr 3
46Zla Gr D	Zinc (.8 max Pb)	Slabs	B6-49 Gr 4
46Zla Gr E	Zinc (1 max Pb)	Slabs	B6-49 Gr 5
46Z2b Cl A	Zn, 4 Al	Die castings	B86-48 Gr XXIII
46Z2b Cl B	Zn, 4 Al, 1 Cu	Die castings	B86-48 Gr XXV
47A2d	99.0 min Al	Sheet, strip	B209-49T Gr 990A

Nonferrous specifications (continued)

Spec. No.	Approximate composition	Form	Similar to ASTM
47A3c	Al, 4.5 Cu (17S)	Plate, sheet	B209-49TGS41A
47A4e	Al, 1.2 Mn (3S)	Plate, sheet	B209-49T-MIA
47A5b Gr A	99.0 min Al	Foil	B209-49T Gr 990A
47A5b Gr B	Special aluminum	Foil	
47A6b	Al, 4.5 Cu (17S)	Sheet	B209-49T-GS41A
47A7	Al, 1.2 Mn (3S)	Plate	B209-49T-MIA
47A8a	Al, 4.5 Cu, 1.5 Mg (24S)	Sheet	B209-49T-CG42A
47A10d	Al, 4.5 Cu, 1.5 Mg (24S)	Sheet, strip	B209-49T-CG42A
47A11b	Al, 2.5 Mg, .25 Cr (52S)	Sheet, strip	B209-49T-GR20A
47A12a	Al, 1.2 Mg, .3 Cr (53S)	Plate, sheet	B209-49T-GS11B
47B2	65 Cu, 3 Pb, 1.5 Sn, bal. Zn	Shapes	B21-49T Gr C
47B3	72 Cu, 1 Sn, bal. Zn	Plates	B171-49 Admiralty
47C2f	99.9 min copper	Shapes	B133-49T B149-49
47C3	Cu, P	Brazing rod	Phos-Copper
47L1b Gr A	99.9 min Pb	Sheets	B29-49 Acid
47L1b Gr B	99.5 min Pb	Sheets	B29-49 Comm. A
47M2a Al 8	Mg, 6 Al, 1 Zn	Sheets	B90-49T
47M2a Al 11	Mg, 1 Mn	Sheets	B90-49T-MI
47M2a Al 18	Mg, 3 Al, 1 Zn	Sheets	B90-49T-AZ31A
47N1a	75 Ni, 15 Cr, 9 Fe	Wrought	B167-49T
47Z6b	Zinc	Rolled plate, sheet	B69-39
49B3f	Manganese bronze	Castings	

Spec. No.	Approximate composition	Form	Similar to ASTM
49T13	75 Ni, 15 Cr, 9 Fe	Seamless tubing	B167-49T
49T14	75 Ni, 15 Cr, 9 Fe	Welded tubing	B163-49T Ni-Cr
51M1	Mercury	Prime virgin	
52Z3e	88-95 Zinc	Dust	
O. S. 443	87 Cu, 10 Al, 3 Fe	Various	B30-49 Gr 9A
O. S. 550	Manganese bronze	Castings	B30-49T Gr 8B B147-49 Gr 8B
O. S. 768	Silicon bronze	Sheet, strip	B97-49
O. S. 769	Silicon bronze	Sheet, plate	B97-49
O. S. 770	Silicon bronze	Bars, rods	B124-49 Gr 9
O. S. 808	60 Cu, 1 Sn, bal. Zn	Die castings	B176-49T Gr A
O. S. 817	63 Cu, 1 Pb, bal. Zn	Rod, bar	
O. S. 822	Pb, 5 Sn, 10 Sb	Wire	B23-49 Gr 9
O. S. 839	89 Al, 5 Cu, 3 Si	Perm. mold castings	B108-49T-CS42A
O. S. 840	62 Cu, 2 Pb, bal. Zn	Various	B121-49T Gr 4
O. S. 883	70 Ni, 30 Cu	Seamless tubing	B163-49T Ni-Cu B165-49T
O. S. 889	99.9 min copper	Seamless tubing	B75-49T
O. S. 1331	70 Cu, 30 Zn	Sheet, strip	B19-49T
O. S. 1359 Gr 1	85 Cu, 5 Sn, 5 Pb, 5Zn	Castings	B30-49 Gr 4A
O. S. 1359 Gr 2	80 Cu, 3 Sn, bal. Zn	Castings	
O. S. 1359 Gr 3	88 Cu, 10 Sn, 1 Pb	Castings	B143-49 Gr 2B
O. S. 1373	Silicon bronze	Castings	
M212a5	Al, 4 Cu, 1.3 Mg, 2 Ni	Castings	B26-48T-CN21
M212a6	Al, 10 Cu, .2 Mg	Castings	B26-48T-CG1
M212a10	Al, 1.3 Cu, 5 Si	Castings	B26-48T-SC21

FEDERAL SPECIFICATIONS

These specifications show only generalized description of the products by types, and do not cover details of chemical composition, physical requirements, electrical requirements, or tolerances. The specification should be referred to for this information. The comparative specifications shown are approximate in all cases, as there may be differences in chemistry, physical and other requirements.

Spec. No.	Approximate composition	Form	Similar to ASTM
QQ-A-3.5	Al, 2.5 Mg, .25 Cr (52S)	Bars, shapes	B211-49T-GR20A
QQ-A-318a	Al, 2.5 Mg, .25 Cr (52S)	Plate, sheet	B209-49T-GR20A
QQ-A-325	Al, 1 Mg, .6 Si, .3 Cu (61S)	Bars, shapes	B211-49T-GS11A
QQ-A-327	Al, 1 Mg, .6 Si, .3 Cu (61S)	Plate, sheet	B209-49T-GS11A
QQ-A-331b	Al, 1.2 Mg, .3 Cr (53S)	Bars, shapes, wire	B211-49T-GS11B
QQ-A-334	Al, 1.2 Mg, .3 Cr (53S)	Plate, sheet	B209-49T-GS11B
QQ-A-351b	Al, 4.5 Cu (17S)	Bars, shapes, wire	B211-49T-GS41A
QQ-A-353a	Al, 4.5 Cu (17S)	Plate, sheet	B209-49T-GS41A
QQ-A-354a	Al, 4.5 Cu, 1.5 Mg (24S)	Bars, shapes, wire	B221-49T-CG42A
QQ-A-355a	Al, 4.5 Cu, 1.5 Mg (24S)	Plate, sheet, strip	B209-49T-CG42A
QQ-A-356b	Al, 1.2 Mn (3S)	Bars, shapes	B209-49T-MIA B178-49T-MIA
QQ-A-359b	Al, 1.2 Mn (3S)	Plate, sheet	B209-49T-MIA B178-49T-MIA
QQ-A-361	Al, 4.5 Cu (17S)	Sheet	B209-49T-GS41A
QQ-A-362	Al, 4.5 Cu, 1.5 Mg (24S)	Alclad sheet	B209-49T-CG42A
QQ-A-367b Gr 1	Al, 4.5 Cu (17S)	Forgings	B221-49T-GS41A
QQ-A-367b Gr 2	Al, 4.5 Cu, 1 Si, 1 Mn (25S)	Forgings	B221-49T-CS41A
QQ-A-367b Gr 3	Al, 1 Si	Forgings	B221-49T
QQ-A-367b Gr 5	Al, 1 Si, 1 Mn, 5 Cu	Forgings	B221-49T-GS41A
QQ-A-367b Gr 6	Al, 12 Si, Mn, Ni (32S)	Forgings	B221-49T
QQ-A-367b Gr 7	Al, 4 Cu, 2 Ni	Forgings	B221-49T
QQ-A-367b Gr 8	Al, 1.2 Mg, .3 Cr (53S)	Forgings	B221-49T-GS11B
QQ-A-371a Cl 1	Al, 1 Mn, 1 Cu	Ingots	
QQ-A-371a Cl 2	Al, 5 Si	Ingots	B179-49T-S5A
QQ-A-371a Cl 3	Al, 7 Si	Ingots	B179-49T-SC122A
QQ-A-371a Cl 4	Al, 5 Cu	Ingots	B179-49T-C4A
QQ-A-371a Cl 5	Al, 4 Mg	Ingots	B179-49T-G4A

Spec. No.	Approximate composition	Form	Similar to ASTM
QQ-A-371a Cl 6	Al, 2 Ni	Ingots	B179-49T-CN42A
QQ-A-371a Cl 7	Al, 10 Cu	Ingots	B179-49T-CG100A
QQ-A-371a Cl 8	Al, 4 Cu, 3 Si	Ingots	B179-49T-CS42A
QQ-A-371a Cl 9	Al, 8 Cu, 1 Si	Ingots	B179-49T-CS72A
QQ-A-371a Cl 10	Al, 5 Si, 1 Cu	Ingots	B179-49T-SC54A
QQ-A-371a Cl 11	Al, 5 Si, Cu, Mn, Ni	Ingots	B179-49T
QQ-A-371a Cl 12	Al, 12 Si	Ingots	B179-49T-S12A
QQ-A-411b	99.0 min Al (2S)	Bars, shapes	B211-49T-990A
QQ-A-451a Cl 1	98.0 min Al	Ingots	B24-46 Gr 98.0
QQ-A-451a Cl 2	99.0 min Al	Ingots	B24-46 Gr 99.0
QQ-A-451a Cl 3	99.3 min Al	Ingots	B24-46 Gr 99.3
QQ-A-451a Cl 4	99.5 min Al	Ingots	B24-46 Gr 99.5
QQ-A-451a Cl 5	99.75 min Al	Ingots	B24-46 Gr 99.75
QQ-A-561a	99.0 min Al (2S)	Plate, sheet	B209-49T-990A
QQ-A-591a Cl 1	Al, 12 Si (13S)	Die casting	B85-49T-S5
QQ-A-591a Cl 2	Al, 12 Si (13X)	Die casting	B85-49T-S9
QQ-A-591a Cl 3	Al, 5 Si (43)	Die casting	B85-49T-S4
QQ-A-591a Cl 4	Al, 7 Cu, 2 Si	Die casting	B179-49T-CS72A
QQ-A-591a Cl 5	Al, 4 Cu, 5 Si (85)	Die casting	B85-49T-SC2
QQ-A-591a Cl 5A	Al, 4 Cu, 5 Si, .4 Ni	Die casting	B85-49T-SC2
QQ-A-591a Cl 7	Al, 8 Mg (218)	Die casting	B85-49T-G2
QQ-A-591a Cl 8	Al, 5 Si	Die casting	B85-49T-S4
QQ-A-591a Cl 9	Al, 3.5 Mg (214)	Die casting	B85-49T-G4A
QQ-A-591a Cl 10	Al, 9 Si, 4 Cu (A380)	Die casting	B85-49T
QQ-A-591a Cl 11	Al, 9 Si, 4 Cu, 2 Fe (380)	Die casting	B85-49T
QQ-A-591a Cl 12	Al, 10 Si, .5 Mg, .5 Cu, 2 Fe (360)	Die casting	B85-49T

Nonferrous specifications (continued)

Spec. No.	Approximate composition	Form	Similar to ASTM
QQ-A-596 Cl 1	Al, 7 Cu, 3.5 Si	Perm. mold casting	B108-49T-CS72A
QQ-A-596 Cl 2	Al, 10 Cu	Perm. mold casting	B108-49T-CG100A
QQ-A-596 Cl 3	Al, 4 Cu, 2 Ni	Perm. mold casting	B108-49T-CN42A
QQ-A-596 Cl 4	Al, 5 Cu, 3 Si	Perm. mold casting	B108-49T-CS42A
QQ-A-596 Cl 5	Al, 5 Cu, 5 Si	Perm. mold, casting	B108-49T-CS64A
QQ-A-596 Cl 6	Al, 5 Si, 1 Cu	Perm. mold casting	B108-49T-SC51A
QQ-A-596 Cl 7	Al, 5 Si	Perm. mold casting	B108-49T-S5A
QQ-A-596 Cl 8	Al, 7 Si	Perm. mold casting	B108-49T-SG70A
QQ-A-596 Cl 9	Al, 12 Si, 2.5 Ni	Perm. mold casting	B108-49T-SN122A
QQ-A-596 Cl 10	Al, 12 Si, 1.5 Cu	Perm. mold casting	B108-49T-SC122A
QQ-A-601a Cl 1	Al, 1 Mn, 1.5 Cu	Sand casting	B26-48T
QQ-A-601a Cl 2	Al, 5 Si (43)	Sand casting	B26-48T-S5A
QQ-A-601a Cl 3	Al, 7 Si (356)	Sand casting	B26-48T-SG70A
QQ-A-601a Cl 4	Al, 4.5 Cu, 1.2 Si (195)	Sand casting	B26-48T-C4A
QQ-A-601a Cl 5	Al, 4 Mg (214)	Sand casting	B26-48T-G4A
QQ-A-601a Cl 6	Al, 4 Cu, 2 Ni (142)	Sand casting	B26-48T-CN42A
QQ-A-601a Cl 7	Al, 10 Cu (122)	Sand casting	B26-48T-CG100A
QQ-A-601a Cl 8	Al, 4 Cu, 3 Si (108)	Sand casting	B26-48T-CS43A
QQ-A-601a CL 9	Al, 8 Cu, 1 Si (113)	Sand casting	B179-49T-CS104B
QQ-A-601a Cl 10	Al, 5 Si, 1.2 Cu (355)	Sand casting	B26-48T-SC51A
QQ-A-601a Cl 11	Al, 5 Si, Cu, Mn, Ni	Sand casting	B26-48T
QQ-A-601a Cl 12	Al, 12 Si	Perm. mold casting	B108-49T-SC122A
QQ-A-601a Cl 16	Al, 10 Mg (220)	Sand casting	B26-48T-G10A
QQ-A-601a Cl 17	Al, 5 Zn, .5 Cr (40E)	Sand casting	B26-48T-ZG61A
QQ-A-601a Cl 18	Al, 6 Si, 4 Cu, 1 Zn (319)	Sand casting	B26-48T-SC64C
QQ-A-601a Cl 20	Al, 8 Si, 2 Cu, .5 Mg	Sand casting	B26-48T-SC82A
QQ-A-601a Cl 21	Al, 2 Cu, 1 Mg, 1 Zn, 1.5 Sn (Ti)	Sand casting	B26-48T
QQ-B-591	78-82 Cu, bal. Zn	Anodes	
QQ-B-601 Gr A	83-86 Cu, bal. Zn	Castings	B143-49
QQ-B-601 Gr B	83-86 Cu, bal. Zn	Castings	B143-49
QQ-B-611a Gr A	Cu, 2 Pb, 38 Zn	Forgings	B124-49 Gr 2
QQ-B-611a Gr B	62 Cu, 3 Pb, bal. Zn	Bars	B16-49
QQ-B-611a Gr C	66 Cu, 33 Zn	Shapes	B36-49T Gr 8
QQ-B-611a Gr D	Cu, 2.5 Pb, 33 Zn	Shapes, bars	B121-49T Gr 6
QQ-B-611a Gr E	70 Cu, 30 Zn	Shapes	B19-49T
QQ-B-621a Gr A	60 Cu, 40 Zn	Castings	B30-49 Gr 6C
QQ-B-621a Gr B	76 Cu, 3 Sn, 6 Pb, Zn	Castings	B145-49 Gr 5B
QQ-B-636	60 Cu, 40 Zn	Bars, rods, forgings	B171-49 B124-49 Gr 3
QQ-B-666 Gr A	92-96 Cu, 4-7 Al	Bars, shapes, sheets	B124-49 Gr 10 B145-49 Gr 5B
QQ-B-666 Gr B	78-93 Cu, 8 Al, 5 Ni, 4 Fe	Bars, shapes, sheets	B150-49T Gr 1
QQ-B-671a Cl A	78 min Cu, Al, Mn	Castings	B148-49 Gr 9D
QQ-B-671a Cl B	88 min Cu, 10 Al	Castings	B30-49 Gr 9B B148-49 Gr 9B
QQ-B-671a Cl C	78 min Cu, Al, Mn	Castings	B148-49 Gr 9D
QQ-B-671a Cl D	78 min Cu, Al, Mn	Castings	B148-49 Gr 9D
QQ-B-691b Cl 1	88 Cu, 6 Sn, 1.5 Pb	Castings	B61-49 B143-49 Gr 2A
QQ-B-691b Cl 2	85 Cu, 5 Sn, 5 Pb, 5 Zn	Castings	B61-49 B145-49 Type 4A
QQ-B-691b Cl 3	80 Cu, 10 Zn, 5 Sn, 3 Pb	Castings	
QQ-B-691b Cl 4	85 Cu, 3 Sn, bal. Zn	Castings	
QQ-B-691b Cl 5	88 Cu, 10 Sn, bal. Zn	Castings	B143-49 Gr 1B
QQ-B-691b Cl 6	87 Cu, 8 Sn, 1 Pb	Castings	B143-49 Gr 2B
QQ-B-691b Cl 6X	87 Cu, 8 Sn, 1 Pb	Castings	B143-49 Gr 2B
QQ-B-691b Cl 7	77 Cu, 6 Sn, 17 Pb	Castings	B66-49 Med. bronze
QQ-B-691b Cl 8	84 Cu, 8 Sn, 8 Pb	Castings	B144-49 Gr 3B
QQ-B-691b Cl 9	85 Cu, 15 Sn	Castings	B22-49 Gr B
QQ-B-691b Cl 10	81 Cu, 19 Sn	Castings	B22-49 Gr A
QQ-B-691b Cl 11	80 Cu, 3 Sn, 7 Pb	Castings	B30-49 Gr 5A
QQ-B-691b Cl 12	83 Cu, 7 Sn, 7 Pb	Castings	B144-49 Gr 3B
QQ-B-701a Gr 1	88 Cu, 6 Sn, 1.5 Pb	Ingots	B30-49 Gr 2A
QQ-B-701a Gr 2	85 Cu, 5 Sn, 5 Pb, 5 Zn	Ingots	B30-49 Gr 4A
QQ-B-701a Gr 3	80 Cu, 10 Zn, 5 Sn, 3 Pb	Ingots	
QQ-B-701a Gr 4	85 Cu, 3 Sn, 6 Pb	Castings	B30-49 Gr 5A
QQ-B-701a Gr 5	88 Cu, 10 Sn, bal. Zn	Ingots	B30-49 Gr 1A
QQ-B-701a Gr 6	87 Cu, 8 Sn, 1 Pb	Ingots	B30-49 Gr 1B
QQ-B-701a Gr 7	77 Cu, 6 Sn, 17 Pb	Castings	B66-49 Med, bronze
QQ-B-701a Gr 8	84 Cu, 8 Sn, 8 Pb	Ingots	B30-49 Gr 3B
QQ-B-701a Gr 9	85 Cu, 14 Sn	Castings	B22-49 Gr B
QQ-B-701a Gr 10	81 Cu, 19 Sn	Castings	B22-49 Gr A
QQ-B-721a Gr A	57-60 Cu, 1 Sn, .5 Mn, bal. Zn	Various	B124-49 Gr 4 B138-49 Gr 4
QQ-B-721a Gr B	63-68 Cu, 3 Fe, 4 Mn, 5 Al, bal. Zn	Castings	B30-49 Gr 8B B147-49 Gr 8B
QQ-B-726c Gr A	Mn bronze	Castings	B147-49
QQ-B-726c Gr B	Mn bronze	Castings	B30-49 Gr 8B B147-49 Gr 8B
QQ-B-726c Gr C	Mn bronze	Castings	B30-49 Gr 8B B147-49 Gr 8B
QQ-B-726c Gr D	Mn bronze	Castings	B132-49 Gr A
QQ-B-731b	Mn bronze	Ingots	
QQ-B-746a Gr A	94 min Cu, 3.5 Sn	Plate, sheet	B100-49 Gr A
QQ-B-746a Gr B	89 min Cu, 9 Sn	Bars, sheets, shapes	B103-49 Gr D B139-49T Gr D
QQ-B-746a Gr D	Cu, 10 Sn, P	Sheet, shapes	B139-49T Gr D
QQ-C-61	Cadmium	Anodes	
QQ-C-493	Copper	Anodes	
QQ-C-501a	99.9 min Cu	Shapes	B133-49T
QQ-C-504	Copper	Bars, rods, shapes	B187-49T
QQ-C-521b Gr A	99.9 min Cu	Ingots	B4-42; B5-43
QQ-C-521b Gr B	99.5 min Cu	Ingots	
QQ-C-541	Cu-Ni alloy	Bars, tubes, sheets	
QQ-C-551	60 min Ni, 23 min. Cu, 3 Fe	Wrought	
QQ-C-557	Cu-Ni alloy	Shot	
QQ-C-571 Gr A	Cu, 14P	Ingots	B52-48 Gr A
QQ-C-571 Gr B	Cu, 10P	Ingots	B52-48 Gr B
QQ-C-581	Cu, 11 Si	Various	B53-46 Gr A
QQ-C-591a Gr A	Cu, 3 Si, 1 Mn, 4 Zn, 1 Sn	Various	B124-49 Gr 9
QQ-C-591a Gr B	Cu, 1 Si, 1 Zn, 2 Sn	Various	B124-49 Gr 8
QQ-C-591a Gr D	Cu, 3 Si, .4 Pb, 2 Sn, 4 Zn	Various	B124-49 Gr 9
QQ-C-593	Cu, 1-5 Si, 5 Zn, 1.5 Mn, 2 Sn	Castings	B124-49 Gr 9
QQ-F-838	Fusible alloys	Ingots, bars	
QQ-L-156	99.7 min lead	Caulking lead	B29-49 Gr B
QQ-L-171 Gr A	99.9 min lead	Pigs	B29-49 Acid
QQ-L-171 Gr B	95.0 min lead	Pigs	B29-49
QQ-L-201 Gr A	99.9 min lead	Sheet	B29-49 Acid
QQ-L-201 Gr B	99.5 min lead	Sheet	B29-49 Gr B
QQ-M-38	Mg alloys (2 grades)	Die castings	B94-49T
QQ-M-44	Mg, 3 Al, 1 Zn	Plate, sheet	B90-49T-AZ31A
QQ-M-54	Mg, 1.5 Mn	Plate, sheet	B90-49T-MIA
QQ-M-55	Mg alloys (2 grades)	Perm. mold casting	B199-49T
QQ-M-56	Mg alloys (4 grades)	Sand castings	B80-49T
QQ-M-161a Gr 1	92 Sn, 5 Sb	Bearing metal	B23-49T Gr 1

Nonferrous specifications (continued)

Spec. No.	Approximate composition	Form	Similar to ASTM
QQ-M-161a Gr 2	88 Sn, 7 Sb	Bearing metal	
QQ-M-161a Gr 3	84 Sn, 8 Sb	Bearing metal	B23-49T Gr 3
QQ-M-161a Gr 4	81 Sn, 13 Sb	Bearing metal	B102-48 Gr 2
QQ-M-161a Gr 6	80 Pb, 15 Sb	Bearing metal	B23-49T Gr 8
QQ-M-161a Gr 7	75 Pb, 15 Sb, 10 Sn	Bearing metal	B23-49T Gr 7
QQ-N-265	Nickel	Anodes	
QQ-N-281 Cla A	63-70 Ni, 2.5 Fe, bal. Cu	Various	B163-49 B127-49
QQ-N-281 Cl B	63-70 Ni, 2.5 Fe, bal. Cu	Various	B164-49T Gr B
QQ-N-286	63-70 Ni, 2-4 Al, 2 Fe, bal. Cu	Various	
QQ-N-301 Gr A	99.5 min nickel	Cathodes	B39-22 Elect.
QQ-N-301 Gr B	98.9 min nickel	Shot	B39-22 Gr X
QQ-N-301 Gr C	97.75 min nickel	Shot	B39-22 Gr A
QQ-N-321 Gr A	65 Cu, 18 Ni, bal. Zn	Shapes	B122-49T Gr 2
QQ-N-321 Gr B	65 Cu, 18 Ni, Pb, bal. Zn	Shapes	B151-49T Gr C
QQ-R-571 Type A	60 Cu, 40 Zn (Naval brass)	Welding rod	B64-43
QQ-R-571 Type B	60 Cu, 40 Zn (Naval brass)	Welding rod	B21-49T Gr A
QQ-R-571 Type C	99.75 min cu, .10 min S or .05 min P	Welding rod	B64-43
QQ-R-571 Type D	99.0 min Cu	Welding rod	B24-46 Gr 99.0 B184-43T
QQ-R-571 Type E	Al, 5 Si	Welding rod	B179-49T-S5A
QQ-R-571 Type F	60 min Ni, 30 Cu, Fe	Welding rod	
QQ-S-551 Gr A	50 Cu, 50 Zn	Braze solder	B64-43 Gr 50-50
QQ-S-551 Gr B	50 Cu, 4 Sn, bal. Zn	Braze solder	
QQ-S-551 Gr C	70 Cu, 30 Zn	Braze solder	B134-49 Gr 6
QQ-S-551 Gr D	80 Cu, 20 Zn	Braze solder	B134-49 Gr 4
QQ-S-554	Gold solder	Shapes, wire	
QQ-S-561d Cl 1	45 Ag, 55 Cu	Wire, strip	B73-29 Gr 4
QQ-S-561d Cl 2	65 Ag, 35 Cu	Wire, strip	B73-29 Gr 6
QQ-S-561d Cl O	46 Cu, 35 Zn, 20 Ag	Various	Silver solder
QQ-S-571b Cl A	50 Sn, 50 Pb	Various	B32-49 Gr 50A
QQ-S-571b Cl B	40 Sn, 60 Pb	Various	B32-49 Gr 40A
QQ-S-571b Cl D	35 Sn, 1 Sb, 64 Pb	Various	B32-49 Gr 35B
QQ-S-571b Cl E	30 Sn, 70 Pb	Various	B32-49 Gr 30A
QQ-S-571b Cl F	70 Sn, 30 Pb	Various	B32-49 Gr 70A
QQ-S-571b Cl G	20 Sn, 80 Pb	Various	B32-49 Gr 20B
QQ-S-571b Cl H	60 Sn, 40 Pb	Various	B32-49 Gr 60A
QQ-T-351	96 min Sn, 3.5 P	Ingot	
QQ-T-371a Gr A	99.75 min tin	Pig	
QQ-T-371a Gr B	98 min tin	Pig	

Spec. No.	Approximate composition	Form	Similar to ASTM
QQ-W-321b Gr A	67 Cu, 33 Zn	Wire	B134-49 Gr 7
QQ-W-321b Gr B	67 Cu, 33 Zn	Wire	B134-49 Gr 7
QQ-W-321b Gr C	70 Cu, 30 Zn	Wire	B134-49 Gr 6
QQ-W-336a	Copper	Trolley wire	B1-49
QQ-W-339	Copper	Med. hard-drawn	B2-49
QQ-W-341a	Copper	Annealed wire	B3-45
QQ-W-401	94 min Cu, 3.5 Sn	Spring wire	B100-49 Gr 1 B159-49T Gr A
QQ-Z-301a	Zinc	Plate, sheet, strip	B69-39
QQ-Z-351a Gr A1	Pure Zinc	High grade slab	B6-49 Gr 1A
QQ-Z-351a Gr A	Pure Zinc	High grade slab	B6-49 Gr 1
QQ-Z-351a Gr B	Intermediate grade zinc	Slab	B6-49 Gr 2
QQ-Z-351a Gr C	Special brass zinc	Slab	B6-49 Gr 3
QQ-Z-351a Gr D	Selected zinc	Slab	B6-49 Gr 4
QQ-Z-351a Gr E	Prime western zinc	Slab	B6-49 Gr 5
QQ-Z-363 A	Zn, 4 Al, .5 Mg	Die castings	B86-48 Gr XXIII
QQ-Z-363 B	Zn, 4 Al, 1 Cu	Die castings	B86-48 Gr XXV
TT-A-468	Aluminum	Powder, paste or paint	
WW-P-351 Gr A	85 Cu, 15 Zn	Seamless pipe	B43-49
WW-P-351 Gr B	67 Cu, 33 Zn	Seamless pipe	B169-49T Gr 3
WW-P-351 Gr C	65 Cu, 35 Zn	Seamless pipe	B169-49T Gr 3
WW-P-377	Copper	Seamless pipe	B42-49
WW-P-448a Comp. 1	88 Cu, 6 Sn, 1.5 Pb	Pipe fitting	B30-49 Gr 2A
WW-P-448a Comp. 2	85 Cu, 5 Sn, 5 Pb, 5 Zn	Pipe fitting	B62-49 B30-49 Gr 4A
WW-P-448a Comp. 2W	85 Cu, 2 Pb, bal. Zn	Pipe fitting	
WW-P-541a	65 Ni, 35 Cu	Fixtures	B127-49T
WW-T-756a	70 Cu, 1 Sn, bal. Zn	Tubing	B111-49 Gr B
WW-T-783a	99 min Al (2S)	Tubing	B24-46 Gr 99.0
WW-T-785	Al, 4.5 Cu, 1.5 Mg (24S)	Seamless tubing	B210-49T-CG42A
WW-T-786a	Al, 4 Cu (17S)	Tubing	B210-49T-CS41A
WW-T-787	Al, 2.5 Mg, .25 Cr (52S)	Seamless tubing	B210-49T-GR20A
WW-T-788a	Al, 1 Mn (3S)	Seamless tubing	B210-49T-MIA
WW-T-789	Al, 1 Mg, .3 Cu, .6 Si (61S)	Seamless tubing	B210-49T-GS11A
WW-T-790	Al, 1.2 Mg, .25 Cr (53S)	Seamless tubing	B210-49T-GS11B
WW-T-791 Gr 1	85 Cu, 15 Zn	Seamless tubing	B135-49T Gr 1
WW-T-791 Gr 2	67 Cu, 33 Zn	Seamless tubing	B135-49T Gr 3
WW-T-791 Gr 3	65 Cu, 35 Zn	Seamless tubing	B135-49 Gr B B134-49 Gr 7
WW-T-797	99.5 min Cu	Seamless tubing	B75-49T Type DPA
WW-T-799a	99.5 min Cu	Seamless tubing	B75-49T Type DPA
WW-T-825 (AZ31X)	Mg, 3 Al, 1 Zn	Extruded tubes	B217-49T-AZ31A
WW-T-825 (AZ61X)	Mg, 6 Al, 1 Zn	Extruded tubes	B217-49T-AZ61A
WW-T-825 (MI)	Mg, 1.2 Mn	Extruded tubes	B217-49T-MIA

SOCIETY OF AUTOMOTIVE ENGINEERS SPECIFICATIONS

Spec. No.	Approximate composition	Form	Similar to ASTM
SAE 1A	45 Sn, 55 Pb	Various, solder	B32-49 Gr 45B
SAE 1B	43 Sn, 2 Sb, bal. Pb	Various, solder	B32-49 Gr 45B
SAE 2A	40 Sn, 60 Pb	Various, solder	B32-49 Gr 40B
SAE 2B	38 Sn, 2 Sb, bal. Pb	Various, solder	B32-49 Gr 40C
SAE 3A	30 Sn, 70 Pb	Various, solder	B32-49 Gr 30B
SAE 3B	28 Sn, 2 Sb, bal. Pb	Various, solder	B32-49 Gr 30C
SAE 4A	25 Sn, 75 Pb	Various, solder	B32-49 Gr 25B
SAE 4B	25 Sn, 1.5 Sb, bal. Pb	Various, solder	B32-49 Gr 25C
SAE 5A	20 Sn, 80 Pb	Various, solder	B32-49 Gr 20B
SAE 5B	20 Sn, 1.5 Sb, bal. Pb	Various, solder	B32-49 Gr 20C
SAE 6A	15 Sn, 85 Pb	Various, solder	B32-49 Gr 15B
SAE 6B	15 Sn, bal. Pb	Various, solder	B32-49 Gr 15C
SAE 10	90 Sn, 5 Cu, 5 Sb	Ingots, bearings	B23-49 Gr 1
SAE 11	87 Sn, 6 Cu, 7 Sb	Ingots, bearings	B23-49
SAE 12	88.25 Sn min, 8 Sb, 3 Cu	Ingots, bearings	B23-49 Gr 2
SAE 13	88 Pb, 10 Sb, 5 Sn	Ingots, bearings	B23-49 Gr 19
SAE 14	76 Pb, 14 Sb, 10 Sn	Ingots, Babbitt	B23-49 Gr 7
SAE 15	83 Pb, 15 Sb, 1 As, 1 Sn	Ingots, bearings	B23-49 Gr 12
SAE 17P plated	99.75 min Ag	Bearing, plated	

Spec. No.	Approximate composition	Form	Similar to ASTM
SAE 17R rolled	99.75 min Ag	Bearing, rolled	
SAE 18	98.4 Cd min, 1-1.6 Ni	Bearings	
SAE 20	Al, .2 Cu, 1.5 Mn, 1 Mg	Sheets	B209-49T-MG11A
SAE 24	Al, 1.5 Mg, 4 Cu (24S)	Wrought	B211-49T-CG42A
SAE 25	99.0 min Al	Wrought	B211-49T-990A
SAE 26	Al, 4 Cu, 1 Mn (17S)	Wrought	B211-49T-CM41A B209-49T-CM41A
SAE 27	Al, 5 Cu, 1 Si, 1 Mn (25S)	Wrought	B209-49T-CS41A B211-49T-CS41A
SAE 29	Al, 1 Mn (3S)	Wrought	B209-49T-MIA B210-49T-MIA
SAE 30	Al, 8 Cu	Castings	B26-48T-CS72A
SAE 31	Al, 10 Zn, 3 Cu	Sand casting	
SAE 32	Al, 12 Cu	Sand casting	
SAE 33	Al, 7 Cu, 2.5 Si, 1.2 Fe	Sand, perm. mold casting	B26-48T-CS72A B179-49T-CS72A
SAE 34	Al, 10 Cu, .25 Mg	Sand, perm. mold casting	B26-48T-CG100A B179-49T-CG100A B108-48T-CG100A

Nonferrous specifications (continued)

Spec. No.	Approximate composition	Form	Similar to ASTM
SAE 35	Al, 5 Si	Sand, perm. mold casting	B26-48T-S5B B179-49T-S5B B108-48T-S5B
SAE 36	Al, 8 Cu, 2 Si	Sand casting	B26-48T-CS72A
SAE 37	Al, 12 Si	Sand casting	B26-48T-S12A B179-49T-S12A
SAE 38	Al, 5 Cu, 1 Si	Sand casting	B26-48T-C4A
SAE 39	Al, 1.6 Mg, 4 Cu, 2 Ni	Sand, perm. mold casting	B26-48T-CN42A B108-48T-CN42A
SAE 40	85 Cu, 5 Sn, 5 Pb, 5 Zn	Castings	B30-49 Gr 4A
SAE 41	67 Cu, 1.5 Sn, 2.5 Pb, bal. Zn	Castings	B30-49 Gr 6B
SAE 42	60 Cu, 18 Ni, 22 Zn	Castings	B151-49T Gr B1
SAE 43	58 Cu, 1.5 Mn, 1 Sn, 1 Al, bal. Zn	Castings	B30-49 Gr 8A
SAE 44	85 Cu, 15 Zn	Castings	
SAE 45	50-53 Cu, bal. Zn	Braze solder	B64-43 Gr 50-50
SAE 48	67-74 Cu, 25-32 Pb	Cast bearing	
SAE 49	73-79 Cu, 21-27 Pb	Cast bearing	
SAE 50	Mg, 6 Al, 3 Zn	Sand casting	B80-49T-AZ63A
SAE 51	Mg, 1.5 Mn	Sheet, strip	B90-49T-MIA
SAE 52	Mg, 3 Al, 1 Zn	Wrought	B107-49T-AZ31B B217-49T-AZ31B
SAE 53	Mg, 3.5 Al, 5 Sn	Forgings	B91-49T-TA54A
SAE 62	88 Cu, 2 Zn, 10 Sn	Castings	B30-49 Gr 1A B143-49 Gr 1A
SAE 63	88 Cu, 10 Sn, 2 Pb, 1 Ni	Castings, lead-gun metal	
SAE 64	80 Cu, 10 Sn, 10 Pb	Castings	B30-49 Gr 3A B144-49 Gr 3A
SAE 65	89 Cu, 11 Sn, .2 P, .5 Pb	Castings	
SAE 65 + Ni	87 Cu, 11 Sn, 2 Ni, .2 P	Castings	
SAE 66	85 Cu, 5 Sn, 9 Pb, 2 Zn	Bearing backs	B144-49 Gr 3C
SAE 67	78 Cu, 6 Sn, 15 Pb, 1 Zn, .75 Ni	Castings	B144-49 Gr 3D
SAE 68A	88 Cu, 9 Al, 3 Fe	Castings	B148-49 Gr 9A
SAE 69B	87 Cu, 11 Al, 2 Fe	Cast or heat treated	B148-49 Gr 9B
SAE 70A	70 Cu, 30 Zn	Sheet	B36-49T Gr 6
SAE 70B	70 Cu, 30 Zn	Sheet	B36-49T Gr 8
SAE 70C	66 Cu, 34 Zn	Sheet	B36-49T Gr 8
SAE 71	99.9 min Cu	Sheet	B152-49T
SAE 72	62 Cu, 3 Pb, bal. Zn	Rod, free cutting	B16-49
SAE 73	60 Cu, 1 Sn, bal. Zn	Rods, bars, forgings	B124-49 Gr A B21-49T Gr A
SAE 74A	60 Cu, .8 Pb, bal. Zn	Seamless tube	B111-49 B135-49T Gr 6
SAE 74B	66 Cu, .8 Pb, bal. Zn	Seamless tube	B135-49T Gr 3
SAE 74C	70 Cu, bal. Zn	Seamless tube	B135-49T Gr 2
SAE 74D	85 Cu, bal. Zn	Seamless tube	B135-49T Gr 1
SAE 75	99.9 min Cu	Tubing	B68-49 Type DLP B75-49T Type DLP
SAE 76	60 Cu, 1 Sn, bal. Zn	Tubing	B135-49T-Nav. br.
SAE 77A	95 Cu, 5 Sn, .1 P	Sheet, strip	B103-49 Gr A
SAE 77C	92 Cu, 8 Sn, .1 P	Sheet, strip	B103-49 Gr C
SAE 79A	85 Cu, bal. Zn	Sheet, strip	B36-49 Gr 3
SAE 79B	80 Cu, bal. Zn	Sheet, strip	B36-49 Gr 4
SAE 80A	70 Cu, bal. Zn	Rod, wire	B134-49 Gr 6
SAE 80B	66 Cu, bal. Zn	Rod, wire	B134-49 Gr 7
SAE 81	95 Cu, 5 Sn, .1 P	Rod, wire	B159-49T Gr A
SAE 82	60 Cu, bal. Zn	Wire	B134-49 Gr 8
SAE 83	Copper	Annealed wire	B3-45
SAE 88	60 Cu, 2 Pb, bal. Zn	Rod	B124-49 Gr 2
SAE 110	89 Sn, 3 Cu, 8 Sb	Cast bearing	B23-49 Gr 2
SAE 180	98.25 min Cd, .5-1 Ag, .6 Cu	Cast bearing	
SAE 201	Al, 2.5 Mg, .25 Cr	Wrought	B209-49T-GR20A
SAE 240	Al, 4.5 Cu, 1.5 Mg, .6 Mn	Sheet, plate	B209-49T-Clad CG42A
SAE 260	Al, 4.4 Cu, .8 Si, .4 Mg	Bars, forgings	B209-49T-Clad CS41A B211-49T-CS41A
SAE 270	Al, 4 Cu, 2 Ni, .5 Mg	Bars, forgings	AMS 4140
SAE 280	Al, 1 Si, .7 Mg, .2 Cr	Forgings	AMS 4125
SAE 281	Al, 1 Mg (61S)	Wrought	B211-49T-GS11A
SAE 282	Al, 1.3 Mg, .7 Si, .2 Cr	Extrusions	B221-49T-GS11B
SAE 290	Al, 12.2 Si, 1 Mg, .9 Cu, .9 Ni	Forgings	AMS 4145
SAE 300	Al, 6 Si, 7 Cu, .4 Mg	Perm. mold castings	B108-49T-CS66A
SAE 304	Al, 5 Si	Sand and die castings	B26-48T-S5A B85-49T-S5A
SAE 305	Al, 12 Si	Die castings	B85-49T-S5
SAE 306	Al, 8 Si, 1 Fe, 3.5 Cu	Die castings	B85-49T-SC6 B179-49T-SG70A
SAE 307	Al, 4 Cu, 5 Si	Die castings	B85-49T-SC2
SAE 308	Al, 8 Si, 2 Fe, 3.5 Cu	Die castings	B85-49T-SC7 B179-49T-SG70A
SAE 309	Al, 9.5 Si, .5 Mg	Die castings	B85-49T-SG3
SAE 310	Al, 5.5 Zn, .6 Mg, .5 Cr	Sand casting	B26-48T-ZG61A
SAE 312	Al, 7 Cu, 2 Si	Die castings	B85-49T B179-49T-CS72A
SAE 320	Al, 4 Mg	Sand casting	B26-48T-G4A
SAE 321	Al, 12 Si, 1 Cu, 3 Ni	Perm. mold casting	B108-48T-SN122A
SAE 322	Al, 5 Si, 1 Cu, .5 Mg	Sand or perm. mold casting	B26-48T-SC51A B108-48T-SC51A
SAE 323	Al, 7 Si, .3 Mg	Sand or perm. mold casting	B26-48T-SG70A B108-48T-SG70A
SAE 324	Al, 10 Mg	Sand casting	B26-48T-G10A
SAE 325	Al, 1 Si, 5 Cu	Sand casting	B26-48T-C4A
SAE 326	Al, 6 Si, 4 Cu	Sand or perm. mold casting	B26-48T-SC64B B108-48T-SC64B
SAE 327	Al, 7.8 Si, 1.5 Cu, .4 Mg, .4 Mn	Sand casting	B26-48T-SC82A
SAE 328	Al, 12 Si, 1.5 Cu, .7 Mg, .7 Mn	Perm. mold casting	B108-48T-SC122A
SAE 329	Al, 6.3 Si, 3.5 Cu	Sand casting	B26-48T-SC64C
SAE 330	Al, 5.5 Si, 4.5 Cu	Perm. mold casting	B108-48T-SC64A
SAE 331	Al, 9 Si, 3.8 Cu	Perm. mold casting	B108-48T
SAE 332	Al, 9.5 Si, 3.5 Cu, .8 Mg, .8 Ni	Perm. mold casting	B108-48T
SAE 380	Al, 3 Si, 5 Cu	Perm. mold casting	B108-48T-CS42A
SAE 430A	65 Cu, .5 Pb, 3 Fe, 3 Mn, bal. Zn	Castings	
SAE 430B	65 Cu, .5 Pb, 3 Fe, 3 Mn, bal. Zn	Castings	
SAE 480	60-70 Cu, 30-40 Pb, 1.5 Ag	Cast bearing	
SAE 481	70 Cu, 3 Sn, 27 Pb	Cast bearing	
SAE 482	70 Cu, 3 Sn, 27 Pb	Cast bearing	
SAE 500	Mg, 9 Al, 2 Zn	Sand casting	B80-49T-AZ92A
SAE 501	Mg, 9 Al, 1 Zn	Die castings	B94-49T-AZ91A
SAE 501A	Mg, 9 Al, 1 Zn	Die castings	B94-49T-AZ91B
SAE 502	Mg, 10 Al	Perm. mold casting	B199-49T-AM100A
SAE 503	Mg, 9 Al, 2 Zn	Perm. mold casting	B199-49T-AZ92A
SAE 510	Mg, 3 Al, 1 Zn	Sheet, strip	B90-49T-AZ31A
SAE 511	Mg, 7 Al, 1 Zn	Sheet, strip	B90-49T
SAE 512	Mg, Al, Zn	Sheet, strip	B90-49T
SAE 520	Mg, 7 Al, 1 Zn	Wrought	B107-49T-AZ61A B91-49T-AZ61A
SAE 521	Mg, 3 Al, 3 Zn	Wrought	
SAE 522	Mg, 1.5 Mn	Rods, bars, tubes	B107-49T-MIA B217-49T-MIA
SAE 523	Mg, 8.5 Al, .5 Zn	Rods, bars, shapes	B107-49T-AZ80A B217-49T-AZ80A
SAE 531	Mg, 6 Al, .7 Zn	Forgings	B91-49T-AZ61A
SAE 532	Mg, 9 Al, .5 Zn	Forgings	B91-49T-AZ80A
SAE 533	Mg, 1.5 Mn	Forgings	B91-49T-MI
SAE 620	87.5 Cu, 8.5 Sn, 4 Zn, 1 Ni	Castings, ingots	B30-49 Gr 1B
SAE 621	87 Cu, 8 Sn, 5 Zn, 1 Ni, 1 Pb	Castings, ingots	B30-49 Gr 2B
SAE 622	88 Cu, 6 Sn, 1.5 Pb, 4.5 Zn	Castings, ingots	B30-49 Gr 2A
SAE 640	86 Cu, 10 Sn, 1 Pb, 1 Ni, .25 P	Castings	
SAE 660	83 Cu, 3 Zn, 7 Sn, 7 Pb, .5 Ni	Cast bearing	B144-49 Gr 3B
SAE 701A	95 Cu, 5 Al	Bars, shapes	B124-49 Gr 10
SAE 701B	80-90 Cu, 4 Fe, 6.5-11 Al, Si, Mn	Rods, bars, shapes	B124-49 B150-49T
SAE 701C	82 Cu, 10 Al, 5 Ni, 3 Fe	Wrought	
SAE 791	88 Cu, 4 Zn, 4 Sn, 4 Pb	Rolled, wrought	B139-49T Gr B2
SAE 792	80 Cu, 10 Sn, 10 Pb	Cast bearing lining	B144-49 Gr 3A B30-49 Gr 3A
SAE 793	83 min Cu, 4 Sn, 8 Pb, 4 Zn	Cast lining	
SAE 794	68.5-75.5 Cu, 3-4 Sn, 21-25 Pb, 3 Zn	Cast lining	
SAE 795	88-92 Cu, .5 Sn, bal. Zn	Rolled, wrought	
SAE 903	Zn, 4 Al	Die casting	B86-48 Gr XXIII
SAE 921	Zn, 4 Al, 3 Cu	Die casting	B86-48 Gr XXI
SAE 925	Zn, 4 Al, 1 Cu	Die casting	B86-48 Gr XXV

AERONAUTICAL MATERIAL SPECIFICATIONS

These specifications show only generalized description of the products by types, and do not cover details of chemical composition, physical requirements, electrical requirements, or tolerances. The specification should be referred to for this information. The comparative specifications shown are approximate in all cases, as there may be differences in chemistry, physical and other requirements. Complete specifications may be obtained from Society of Automotive Engineers, New York City, N. Y.

AMS No.	Approximate Alloy	Condition	Form	Similar To:
4000A	Al 99.7 min	Annealed	Sheet	ASTM B209-49T-9970
4001A	Al 99.0 min (2SO)	Soft	Sheet	ASTM B209-49T-990A Fed. QQ-A-561, Cond. A
4003A	Al 99.0 min (2S-H14)	½-hard	Sheet	ASTM B209-49T-990A SAE 25 Fed. QQ-A-561, Cl ½
4006A	Al, 1.3 Mn (3SO)	Annealed	Sheet, strip	Fed. QQ-A-359a, Cond. A SAE 29
4008A	Al, 1.3 Mn (3S-H14)	½-hard	Sheet	Fed. QQ-A-359a-½H SAE 29; Navy 47A4
4015B	Al, 2.5 Mg, .25 Cr (52SO)	Annealed	Sheet	ASTM B209-49T-GR20A Fed. QQ-A-318, Cond. A
4016B	Al, 2.5 Mg, .25 Cr (52S-H32)	¼-hard	Sheet	ASTM B209-49T-GR20A Navy 47A11; SAE 201
4017B	Al, 2.5 Mg, .25 Cr (52S-H34)	½-hard	Sheet	ASTM B209-49T-GR20A Navy 47A11 Fed. QQ-A-318, Cond. ½H
4025A	Al, 1 Mg, .6 Si, .25 Cr (61SO)	Annealed	Sheet, plate	ASTM B209-49T-GS11A Fed. QQ-A-327, Cond. A
4026A	Al, 1 Mg, .6 Si, .25 Cr	Solution heat treat	Sheet, plate	ASTM B209-49T-GS11A Fed. QQ-A-327, Cond. W
4027A	Al, 1 Mg, .6 Si, .25 Cr	Quenched, aged	Sheet, plate	ASTM B209-49T-GS11A Fed. QQ-A-327, Cond. T
4035B	Al, 4.3 Cu, .6 Mn, 1.5 Mg (24SO)	Annealed	Sheet, plate	Fed. QQ-A-355, Cond. A AN-A-12, Cond. A
4037B	Al, 4.3 Cu, .6 Mn, 1.5 Mg (24S-T3 & T4)	Heat treated	Sheet, plate	Fed. QQ-A-355, Cond. T AN-A-12, Cond. T
4040B	Al, 4.3 Cu, .6 Mn, 1.5 Mg (Alc. 24SO)	Annealed	Alclad sheet	Fed. QQ-A-362, Cond. A Navy 47A8; AN-A-13
4041B	Al, 4.3 Cu, .6 Mn, 1.5 Mg (Alc. 24S-T3 & T4)	Heat treated	Alclad sheet	Fed. QQ-A-362, Cond. T AN-A-13, Cond. T
2042B	Al, 4.3 Cu, .6 Mn, 1.5 Mg (Alc. 24S-T36)	Heat treated, cold-worked	Alclad sheet	Fed. QQ-A-362, Cond. TR AN-A-13, Cond. TR
4044	Al, 5.6 Zn, 2.5 Mg, 1.6 Cu (75SO)	Annealed	Sheet, plate	AN-A-9a, Cond. A
4045	Al, 5.6 Zn, 2.5 Mg, 1.6 Cu (75S-T6)	Quenched, aged	Sheet, plate	AN-A-9a, Cond. T
4062A	Al, 99.0 min (2S-H14)	½-hard	Seamless tubes	Fed. WW-T-783a-½H Navy 44T-19, ½H
4065A	Al, 1.3 Mn (3SO)	Soft anneal	Seamless tubes	Fed. WW-T-788a-A SAE 29
4067A	Al, 1.3 Mn (3S-H14)	½-hard	Seamless tubes	Fed. WW-T-788a-B SAE 29
4070C	Al, 2.5 Mg, 25 Cr (52SO)	Annealed	Seamless tubes	Fed. WW-T-787-A SAE 201
4071	Al, 2.5 Mg, .25 Cr (52S)	Annealed	Hydraulic tubing	ASTM B210-49T-GR20A Fed. WW-T-787 SAE 201
4080C	Al, 1 Mg, .6 Si, .25 Cr (61SO)	Annealed	Seamless tubes	ASTM B210-49T-GS11A MIL-T-7081 Fed. WW-T-789, Cond. A
4082C	Al, 1 Mg, .6 Si, .25 Cr (61T-T6)	Quenched, aged	Seamless tubes	ASTM B210-49T-GS11A Fed. WW-T-789, Cond. T
4083	Al, 1 Mg, .6 Si, .25 Cr (61S-T6)	Quenched, aged	Hydraulic tubing	ASTM B210-49T-GS11A Fed. WW-T-789, Cond. T
4086B	Al, 4.5 Cu, 1.5 Mg (24S-T3)	Solution treated	Hydraulic tubing	ASTM B210-49T-CG42A SAE 24, Temp. T
4087	Al, 4.5 Cu, 1.5 Mg (24SO)	Annealed	Seamless tubes	ASTM B210-49T-CE42A Fed. WW-T-785, Cond. A
[illegible]	[illegible]	[illegible]	Seamless tubes	Navy 44T28, Cond. T
4113B	Al, 4 Cu, .7 Mn, .5 Mg	Heat treated	Rod, bars, shapes	ASTM B211-49T-GS41A

AMS No.	Approximate Alloy	Condition	Form	Similar To:
4282B	Al, 4.4 Cu, 2.5 Si (B195-T6)	Quenched, aged	Permanent mold castings	ASTM B108-49T-CS42A AN-A-36, Class II
4283	Al, 4.5 Cu, 2.5 Si (B195-T4)	Quenched, aged	Permanent mold castings	Fed. QQ-A-596, Comp. 4
4284A	Al, 7 Si, .3 Mg (356-T6)	Quenched, aged	Permanent mold castings	ASTM B108-49T-SG70A Fed. QQ-A-596, Cl 8
4290D	Al, 9.5 Si, .5 Mg (360)	As cast	Die castings	ASTM B85-49T-SG2 AN-QQ-A-366, Alloy 13
4291	Al, 7 Si, 3.5 Cu	As cast	Die castings	AN-A-38, Alloy 85X AN-QQ-A-366, Alloy 85
4292	Al, 11 Si	As cast	Die castings	ASTM B85-49T-S4
4350C	Mg, 6 Al, 1 Zn (AZ61A)	Extruded	Bars, forgings	ASTM B107-49T-AZ61A AN-M-24
4358A	Mg, 6 Al, 1 Zn (AZ61A)	As forged	Forgings	ASTM B91-49T-AZ61A AN-M-20
4360B	Mg, 8.5 Al, .5 Zn (AZ80A)	As forged	Forgings	ASTM B91-49T-AZ80A AN-M-21, Cond. FA
4370	Mg, 1 Mn (M1A)	Annealed	Sheet	ASTM B90-49T-M1A Army 11317, Gr A
4375A	Mg, 3 Al, 1 Zn (AZ31A)	Annealed	Sheet	ASTM B90-49T-AZ31A AN-M-29, Cond. A
4376	Mg, 3 Al, 1 Zn (AZ31A)	Strain hardened	Sheet	ASTM B90-49T-AZ31A
4420E	Mg, 6 Al, 3 Zn (AZ63)	As cast	Sand castings	ASTM B80-49T-AZ63A AN-QQ-M-56
4422F	Mg, 6 Al, 3 Zn (AZ63)	Solution heat treat	Sand castings	ASTM B80-49T-AZ63A AN-QQ-M-56, Comp. A
4424D	Mg, 6 Al, 3 Zn (AZ63)	Quenched, aged	Sand castings	ASTM B80-49T-AZ63A AN-QQ-M-56, Comp. A
4428	Mg, 6 Ce (E6)	Quenched, aged	Sand castings	Alloy E6
4434C	Mg, 9 Al, 2 Zn (AZ92)	Quenched, aged	Sand castings	ASTM B80-49T-AZ92A AN-QQ-M-56, Comp. B
4484C	Mg, 9 Al, 2 Zn (AZ92)	Quenched, aged	Permanent mold castings	ASTM B199-49T-AZ92A AAAF 11349; SAE 503
4490C	Mg, 9 Al, .7 Zn (AZ91C)	As cast	Die castings	ASTM B94-49T-AZ91C AN-M-16
4500B	99.9 Copper	Cold finish, bright anneal	Sheet, strip	ASTM B152-49T-ETP Fed. QQ-C-501
4505D	70 Cu, 30 Zn	Annealed	Sheet, strip	ASTM B36-49T, Gr 6 Fed. QQ-B-611, Comp. E
4507C	70 Cu, 30 Zn	½-hard	Sheet, strip	ASTM B36-49T, Gr 6 Fed. QQ-B-611, Comp. E
4508A	65 Cu, 35 Zn	Laminated	Sheet	ASTM B103-49, Gr A Navy Aero S-122
4510C	95 Cu, 5 Sn	Spring temper	Strip	ASTM B103-49, Gr A Fed. QQ-B-746, Type VI
4520E	88 Cu, 4 Sn, 3.2 Zn, 4 Pb	Cold rolled	Strip	SAE 791
4530E	98 Cu, 1.8 Be	Solution treated	Sheet, strip	ASTM B194-49T AN-C-167, Cond. A
4532A	98 Cu, 1.8 Be	½-hard	Sheet, strip	ASTM B195-49T AN-C-167, Cond. ½H
4544A	67 Ni, 30 Cu, 2.5 Fe	Annealed	Sheet, strip	ASTM B127-49T Fed. QQ-N-281, Cl A
4555B	68 Cu, .8 Pb, bal. Zn	Light anneal	Tubing	ASTM B135-49T, Cl 2
4558A	66 Cu, 1.6 Pb, 32 Zn	Drawn	Seamless tubing	ASTM B135-49T, Cl 4
4574A	67 Ni, 30 Cu, 2.5 Fe	Cold-drawn, annealed	Tubing	ASTM B165-49T Navy 44T38
4575A	67 Ni, 30 Cu, 2.5 Fe	Annealed	Tubing	Monel Metal
4610E	61.5 Cu, 3 Pb, bal. Zn	½-hard	Rods, bars	ASTM B16-49 Fed. QQ-B-611, Comp. B
4611B	61 Cu, 1 Sn, bal. Zn	½-hard	Rods, bars	ASTM B21-49T, Gr A Fed. QQ-B-636
4612C	61 Cu, 1 Sn, bal. Zn	Hard	Rods, bars	ASTM B21-49T, Gr A Fed. QQ-B-636 Hard
4614D	60 Cu, 2 Pb, bal. Zn	70-120 Bhn	Forgings	ASTM B124-49, Gr 2 Fed. QQ-B-611, Gr A
4615B	95.5 Cu, 3.2 Si	Hard	Rods, bars	ASTM B98-49, Gr A Navy 46B27A
4619B	58 Cu, 1 Fe, 1 Al, .5 Mn, bal. Zn	Special	Forgings	ASTM B138-49
4625D	95 Cu, 5 Sn	Hard	Rods, bars	ASTM B139-49T, Gr A Fed. QQ-B-750, Gr A
4631B	90 Cu, 7 Al, 2 Si	Cold-drawn, annealed	Bronze rods, bars, forgings	ASTM B150-49T, Gr 1

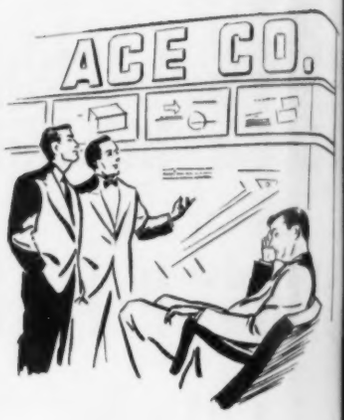
4083	Al, 1 Mg, .6 Si, .25 Cr (61S-T6)	Quenched, aged	Hydraulic tubing	ASTM B210-49T-GS11A Fed. WW-T-789, Cond. T
4086B	Al, 4.5 Cu, 1.5 Mg (24S-T3)	Solution treated	Hydraulic tubing	ASTM B210-49T-CG42A SAE 24, Temp. T
4087	Al, 4.5 Cu, 1.5 Mg	Annealed	Seamless tubes	ASTM B210-49T-CE42A
4118B	Al, 4 Cu, .7 Mn, .5 Mg (17S-T4)	Heat treated	Rod, bars, shapes	Navy 44T28, Cond. T ASTM B211-49T-GS41A Fed. QQ-A-351, Cond. T
4120B	Al, 4.3 Cu, 1.5 Mg, .6 Mn (24S-T4)	Heat treated	Rolled bars	ASTM B211-49T-CG42A Fed. QQ-A-354a, Cond. T
4121	Al, 4 Cu, .8 Si, .5 Mg (14S-T6)	Quenched, aged	Rolled bars	Alloy 14S-T6
4122A	Al, 5.6 Zn, 1.6 Cu, .25 Cr (75S-T6)	Quenched, aged	Rods, bars, shapes	AN-A-11 Cond. T-Rolled
4125C	Al, .9 Si, .6 Mg (A51S-T6)	Quenched, aged	Forgings	Fed. QQ-A-367, Class 3 SAE 280
4130E	Al, 4.5 Cu, .9 Si (25S-T6)	Quenched, aged	Forgings	ASTM B221-49T-CS41A Fed. QQ-A-367, Class 2
4134	Al, 4 Cu, .8 Si, .8 Mg (14S-T4)	Quenched	Forgings	Alloy 14S-T4
4135F	Al, 4 Cu, .8 Si, .8 Mg (14S-T6)	Quenched, aged	Forgings	Alloy 14S-T6
4137	Al, 1.5 Zn, 1.6 Mg, .6 Cu (76S-T6)	Quenched, aged	Forgings	AAF 11352-A
4139D	Al, 5.6 Zn, 2.5 Mg, 1.6 Cu (75S-T)	Quenched, aged	Forgings	Alloy 75S-T
4140C	Al, 4 Cu, 2 Ni, .6 Mg (18S-T61)	Quenched, aged	Forgings	Fed. QQ-A-367, Gr 7 Navy 46A7, Gr 7
4142	Al, 4 Cu, 2 Ni, .6 Mg (B18S-F)	As forged	Forgings	Alloy 18S-F
4145D	Al, 12 Si, 1 Mg, .9 Cu (32S-T6)	Quenched, aged	Forgings	Fed. QQ-A-367, Gr 6 Navy 46A7, Gr 6
4150A	Al, 1 Mg, .6 Si, .25 Cr (61S-T6)	Quenched, aged	Extruded bars, shapes, tubes	Fed. QQ-A-325, Cond. T ASTM B221-49T-GS11B
4151A	Al, 4 Cu, .7 Mn, .5 Mg (17S-T4)	Heat treated	Extruded rods, bars, shapes	ASTM B211-49T-GS41A Fed. QQ-A-351, Cond. T
4152D	Al, 4.5 Cu, 1.5 Mg, .6 Mn (24S-T4)	Heat treated	Extruded rods, bars, shapes	ASTM B211-49T-CG42A Fed. QQ-A-354, Cond. T
4153	Al, 4.5 Cu, .9 Si, .8 Mn (14S-T6)	Quenched, aged	Extruded rods, bars, shapes	AN-A-8, Cond. T
4154C	Al, 5.6 Zn, 2.5 Mg, 1.6 Cu (75S-T6)	Quenched, aged	Extruded bars, rods, shapes	AN-A-11, Cond. T
4156	Al, .65 Mg, .4 Si (63S-T6)	Quenched, aged	Extrusions	Alloy 63S-T6
4180A	Al 99.0 min (2S-H18)	Hard	Wire	ASTM B211-49T-990A AN-W-20, Type II
4182	Al, 5 Mg, .12 Cr (56SO)	Annealed	Wire	Alloy 56S-O
4184	Al, 10 Si, 4 Cu (716)	Annealed	Brazing wire	Alloy 716
4185	Al, 12 Si (718)	Annealed	Brazing wire	Alloy 718
4190	Al, 5 Si (43S)	Drawn, rolled, extruded	Welding rods	Alloy 43S
4201D	Al, 5 Si, 1.3 Cu, .5 Mg (355-T51)	Aged	Sand castings	ASTM B26-48T-SC51A Fed. QQ-A-601, Cl 10HT3
4212C	Al, 5 Si, 1.3 Cu, .5 Mg (355-T6)	Quenched, aged	Sand castings	ASTM B26-48T-SC51A Fed. QQ-A-601, Cl 10HT1
4214B	Al, 5 Si, 1.3 Cu, .5 Mg (355-T71)	Quenched, overaged	Sand castings	ASTM B26-48T-SC51A SAE 322
4217A	Al, 7 Si, .3 Mg (356-T6)	Quenched, aged	Sand castings	ASTM B26-48T-SG70A Fed. QQ-A-601, Comp. 3 AN-QQ-A-394
4220B	Al, 4 Cu, 2 Ni, 1.5 Mg (Al42-T75)	Quenched, overaged	Sand castings Air cooled cylinder heads	ASTM B26-48T-CN42A
4222B	Al, 4 Cu, 2 Ni, 1.5 Mg (142-T77)	Quenched, overaged	Sand castings Air cooled cylinder heads	ASTM B26-48T-CN42A
4230	Al, 4.5 Cu (195-T4)	Quenched	Sand castings	ASTM B26-48T-C4A AN-QQ-A-390, Class 1 Fed. QQ-A-601, Comp. 4T
4231A	Al, 4.5 Cu (195-T6)	Quenched, aged	Sand castings	ASTM B26-48T-C4A Fed. QQ-A-601, Comp. 4T
4240A	Al, 10 Mg (220-T4)	Quenched	Sand castings	Fed. QQ-A-601, Comp. 16 AN-A-33
4275	Al, 6 Sn, 1 Cu, 1 Ni (750-T5)	Stress relieved	Permanent mold castings	Alloy 750-T5
4280B	Al, 5 Si, 1.3 Cu, .5 Mg (355-T71)	Quenched, overaged	Permanent mold castings	ASTM B108-49T-SC51A AN-QQ-A-376, Cl B
4281	Al, 5 Si, 1.3 Cu, .5 Mg (355-T6)	Quenched, aged	Permanent mold castings	ASTM B108-49T-SC51A Fed. QQ-A-596, Cl 6

4615B	95.5 Cu, 3.2 Si	Hard	Rods, bars	ASTM B98-49, Gr A Navy 46B27A
4619B	58 Cu, 1 Fe, 1 Al, .5 Mn, bal. Zn	Special	Forgings	ASTM B138-49
4625D	95 Cu, 5 Sn	Hard	Rods, bars	ASTM B139-49T, Gr A
4631B	90 Cu, 7 Al, 2 Si	Cold-drawn, annealed	Bronze rods, bars, forgings	ASTM B150-49T, Gr 1
4632B	90 Cu, 8.5 Al	Hard	Rods, bars	ASTM B150-49T, Gr 1 Fed. QQ-B-671, Gr B
4635B	87 Cu, 10 Al, 3 Fe	Hard	Rods, bars, forgings	ASTM B150-49T, Gr 1
4640B	81 Cu, 10 Al, 3 Fe, .5 Ni, 1 Mn	Heat treated	Rods, bars, forgings	ASTM B150-49T, Gr 2
4650D	98 Cu, 1.9 Be	Solution treated, cold drawn	Rods, bars, forgings	ASTM B196-49T MIL-C-6941, Cond. A
4665A	96 Cu, 3.2 Si	Soft annealed	Seamless tubing	Navy 44T23 Army 57-192-1
4674A	67 Ni, 30 Cu, 2.5 Fe	Cold-drawn	Rods, bars, forgings	ASTM B164-49T R-Monel
4710A	99.9 min Copper	Cold-drawn, rolled, anneal	Wire for brazing	ASTM B3-45 Fed. QQ-W-341
4710B	65 Cu, 35 Zn	Cold-drawn, annealed	Wire, tinned	Brass
4712A	65 Cu, 35 Zn	Annealed	Wire	ASTM B134-49, Gr 7 SAE 80, Gr B
4713A	65 Cu, 35 Zn	½-hard	Wire	ASTM B134-49, Gr 7 SAE 80, Gr B
4720B	95 Cu, 5 Sn	Spring temper	Spring wire	ASTM B159-49T, Gr A Fed. QQ-W-401
4725A	98 Cu, 1.8 Be	Rolled, quenched	Wire	ASTM B197-49T AN-C-166, Cond. A
4730A	67 Ni, 30 Cu, 2.5 Fe	Annealed	Wire	ASTM B164-49T Fed. QQ-N-281, Cl A
4750	50 Sn, 50 Pb	Solder	Wire, strip, bars, ingots	ASTM B32-49, Gr 50 Fed. QQ-S-571, Gr A
4755	95 Pb, 5 Ag	Solder	Wire, strip, bars, ingots	Army 57-99-1 Navy M-254
4770A	50 Ag, 15 Cu, 16 Zn, 18 Cd	Silver solder	Wire, strip, pig, granular	Fed. QQ-S-561, Cl A Navy 47S13, Gr 4
4772	54 Ag, 40 Cu, 5 Zn, 1 Ni	Cold-drawn or fabricated	Wire, strip, pig, granular	Silver brazing alloy
4800A	91 Sn, 4.5 Sb, 4.5 Cu	Cast	Babbitt bearings with steel or bronze back	ASTM B23-49, Gr 1 Fed. QQ-M-161, Gr 1
4803A	Zn, 4 Al, .04 Mg	Cast	Die casting	ASTM B86-48, Gr XXIII
4805B	90 Cu, 10 Sn	Sintered	Oil impregnated bearings	MIL-B-5687
4815C	99.9 min Silver	Electroplated	Silver plated steel backs for bearings	
4817	Ag, 1.25 max Cu	Cast linings	Steel back bearings	
4820B	71 Cu, 28 Pb, 1 Ag	Cast	Steel-back bearings	SAE 480
4822B	72 Cu, 25 Pb, 3 Sn	Cast	Steel-back bearings	SAE 481
4824A	72-77 Cu, 22-26 Pb, 1 Sn (86 min, Sn, 7 Sb, 5.7 Cu)	Cast	Steel-back bronze or babbitt	
4825B	74 Cu, 16 Pb, 10 Sn	Cast	Steel-back bearings	ASTM B55-49
4827	80 Cu, 10 Sn, 10 Pb	Cast	Steel-back castings	ASTM B144-49, Gr 3A SAE 792
4840A	70 Cu, 24.5 Pb, 5.5 Sn	Cast	Cast bearings	ASTM B55-49 Navy 46B22
4842A	80 Cu, 10 Sn, 10 Pb	Cast	Cast bearings	ASTM B144-49, Gr 3A SAE 64
4845D	86-89 Cu, 9-11 Sn, 1-3 Zn	Special hardness	Castings	ASTM B143-49, Gr 1A Fed. QQ-B-691, Gr 5
4846A	87 Cu, 11 Sn, 2 Zn	Cast	Castings	Fed. QQ-B-691, Gr 2 SAE 40
4855B	85 Cu, 5 Sn, 5 Pb, 5 Zn	Cast	Castings	ASTM B145-49, Gr 4A Fed. QQ-B-691, Gr 2
4860A	55-60 Cu, 38-42 Zn, 1 Fe, 1 Al, .3 Mn	Cast	Castings	ASTM B147-49 Fed. QQ-B-726
4862B	64 Cu, 24 Zn, 5.2 Al, 3.8 Mn, 3 Fe	Cast	Castings	ASTM B147-49 Fed. QQ-B-726, Gr C
4870B	85 Cu, 11.2 Al, 3.6 Fe	Cast	Centrifugal or chill cast	Aluminum Bronze
4871B	85.3 Cu, 10.9 Al, 3.6 Fe	Quenched, tempered	Castings	ASTM B148-49, Gr C AN-QQ-B-672
4872A	85 Cu, 11.2 Al, 3.6 Fe	Cast	Sand castings	ASTM B148-49, Gr C
4873A	85.3 Cu, 10.9 Al, 3.6 Fe	Heat treated	Sand castings	ASTM B148-49, Gr C AN-QQ-B-672
7320A	79 Cu, 16 Sn, 5 Pb	Cast, 72-82 Rb	Cast sealing rings	Bronze
7322A	80 Cu 19 Sn	Cast, 85-92 Rb	Cast sealing rings	Bronze

October 4, 1951

EXHIBITORS

at the metal show



Michigan State Fair Grounds
Detroit, Oct. 15-19

A list showing names of exhibitors with booth numbers and their principal products.

A & B Centerless Grinding Co., Detroit. Booth A115. Ground and polished tubing and shafting.

A.B.C. Die Casting Machine Co., Chicago. Booth G127. Die casting and die-casting machinery.

Acetogen Gas Co., Detroit. Booth A215. Cutting gases.

Acme Manufacturing Co., Detroit. Booth D103. Grinding, polishing, buffing and deburring machines. Automatic welding positioners and work-holding machines.

Acme Steel Co., Chicago. Booth C221. Metal stitchers and production-stitched samples.

Acme Tool Co., New York. Booth A205. Surface plates; parallels; straight edges; toolholders.

Adamas Carbide Corp., Harrison, N. J. Booth H218. Tungsten carbide tool tips, dies, wear parts and powder.

Ajusto Equipment Co., Toledo, Ohio. Booth H147. Laboratory and plant furniture.

Air-Flo Compressor Co., Akron, Ohio. Booth H219. Air compressors.

Ajax Electric Co., Inc., Philadelphia. Booth F421. Salt bath brazing and heat treating.

Ajax Electrothermic Corp., Trenton, N. J. Booth F421. Electric induction furnaces for melting, forging, and heating applications.

Ajax Engineering Corp., Trenton, N. J. Booth F421. Electric induction melting furnaces.

Aktiebolaget Kanthal. Booth G352. (See Kanthal Corp.)

Allegheny Ludlum Steel Corp. Booth G459. (See Scovill Mfg. Co.)

Allied Products Corp., Detroit. Booth F302. Bolts, dies, jigs and fixtures, precision screw machine parts.

Allison Co., Bridgeport, Conn. Booth H431. Abrasive cutting wheels.

Alloy Engineering & Casting Co., Champaign, Ill. Booth B107. Heat resistant and stainless steel castings and furnace parts.

Alox Corp., Niagara Falls, N. Y. Booth C112. Lubricating oil additives for reducing friction, preventing rust, etc.

Alvey-Ferguson Co., Cincinnati, Ohio. Booth H502. Parts washing machines; conveyer systems.

American Brakeblok Div. Booth F339. (See American Brake Shoe Co.)

American Brake Shoe Co., New York City. Booth F339. Heat and corrosion resistant castings; cast iron.

American Chain & Cable Co., Bridgeport, Conn. Booth A342. (See Campbell Machine Division and Wilson Mechanical Instrument Co.)

American Cyanamid Co., New York City. Booth G452. Salt bath heat treating supplies; ladle additions for steel.

American Gas Association, New York City. Booth G160. Industrial gas applications.

American Gas Furnace Co., Elizabeth, N. J. Booth G154. Gas furnaces and burners.

American Machine & Metals, Inc., East Moline, Ill. Booth B246. (See Riehle Testing Machines Div.)

American Machinist. Booth G256. (See McGraw-Hill Publishing Co.)

American Manganese Steel Div. Booth G339. (See American Brake Shoe Co.)

American Metals Co., Ltd. Booth G459. (See Scovill Mfg. Co.)

American Metal Market, New Yo City. Booth C110. Specimen copi of *American Metal Market*, dail newspaper of the metal trade.

American Optical Co., Instrume Division, Buffalo, N. Y. Boot B128. Scientific instruments; m croscopes; comparators.

American Platinum Works, Newar N. J. Booth G240. Silver brazi products and methods.

American Pullmax Co., Inc., Chicag Booth A249. Sheet metal an plate cutting machinery.

American Silver Co., Inc., Flushing L. I. Booth D129. Silver solder precious metals.

American Society of Tool Engineers Detroit. Booth H245. Technica and educational publications an information.

Turn to Page 258

Square D Motor Control

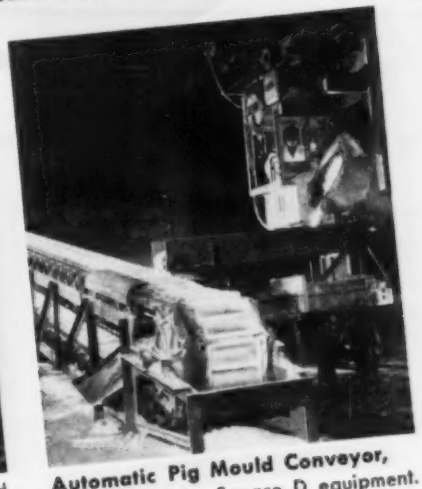
SPEEDS SUPER-AUTOMATIC FOUNDRY PRODUCTION FOR STUDEBAKER . . .

Square D Controlled Core Knockout Machine removes cores by vibration—also removes waste sand and dust.

Typical Square D Motor Control Panel installed in Studebaker's mechanized foundry at South Bend.

At this Iron Pouring Station, Square D devices control sand handling system, moulding conveyor line, dust collecting and iron pouring.

Sand Slinger ramming Drag Cylinder Mold. Square D equipment automatically controls the timing cycle for flask-filling operation.



Automatic Pig Mould Conveyor, controlled by Square D equipment.

Square D Remote Control Panel handles 38 different stations on automatic conveyor system from one centralized location.

STUDEBAKER has doubled its output of motor castings with this automatically-controlled foundry operation.

SQUARE D MOTOR CONTROL puts such automatic production lines through their paces in industrial plants of every kind and size. The completeness of Square D's line meets practically any AC or DC application requirement. Standardized components, each designed to perform a specific control function, are physically proportioned to make up compact, attractive panels. Complete accessibility facilitates speedy inspection and maintenance.

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S. A., MEXICO CITY, D. F.

METAL TURNINGS TO METAL CHIPS . . .

One of four American #3800 Crushers installed in a General Motors plant for the processing of metal turnings.

. . . FOR AMERICA'S BLUE CHIP COMPANIES with

American METAL TURNINGS Crushers

WHY an AMERICAN installation makes Dollars and Sense:

These cost-conscious companies have long-since learned that American-crushed metal turnings quickly recover an initial American Crusher investment in these important ways:

$2 to $3 Extra Profit Per Ton: With higher scrap values for metal chips over ordinary machine shop turnings, a daily crushing capacity of only 2 tons will produce *$1200.00 per year in extra profits.*

Up to 80% Less Space: Reduction to metal chips solves many expensive handling and storage problems, and allows easy briquetting.

30-50 Gallons Per Ton Cutting-Oil Recovery: An important reclamation that adds new profits with an American Crusher installation.

PROMINENT AMERICAN CRUSHER USERS

The users of American Metal Turnings Crushers read like a "Who's Who" of American Industry. Included are such names as:

GENERAL MOTORS • FORD TIMKEN • ALLIS-CHALMERS GENERAL ELECTRIC • BUDD WHEEL • CHRYSLER.

Write for Bulletin
"METAL TURNINGS CRUSHERS"

American

Originators and Manufacturers of Ring Crushers and Pulverizers

1439 MACKLIND AVE.
ST. LOUIS 10, MO.

Exhibitors

American Society for Metals, Cleveland. Booth H323. Technical books and magazines; educational services.

American Society for Metals, Detroit Chapter. Booth H420. Educational and technical activities.

American Wheelabrator & Equipment Corp., Mishawaka, Ind. Booth F439. Blast cleaning machines; shot peening equipment; dust collectors.

Ames Precision Machine Works, Waltham, Mass. Booth A152. Hardness testers.

Amplex Mfg. Co., Detroit. Booth G416. Powder metal parts; oilless bearings.

Anchor Drawn Steel Co. Booth D345. (See Vanadium-Alloys Steel Co.)

Anderson Brothers Mfg. Co., Rockford, Ill. Booth H351. Hydraulic presses.

Anderson Oil Co., F. E., Portland, Conn. Booth F255. Metalworking fluids, rust preventives.

Angier Corp., Framingham, Mass. Booth G139. Rust preventive wrappings.

Applied Research Laboratories, Glendale, Calif. Booth G121. Spectrochemical equipment.

Arcos Corp., Philadelphia. Booth F457. Arc welding electrodes; oxy-arc cutting process.

Aronson Machine Co., Arcade, N. Y. Booth C127. Positioners and turning rolls.

Ashdee Products, Inc., Homewood, Ill. Booth G361. Paint spray equipment and products.

Ashworth Brothers, Inc., Worcester, Mass. Booth D140. Metal conveyer belts.

Atlas Press Co., Kalamazoo, Mich. Booth A241. Lathes, drills, shapers.

Aurora Metal Co., Aurora, Ill. Booth C215. Die castings.

Austenal Laboratories, Inc., New York City. Booth B142. Microcastings made in high-temperature alloys, low alloys, S.A.E. steels and tool steels.

Automotive Industries, Philadelphia. Booth A256. Editorial material.

Avon Tube Division, Higbie Mfg. Co., Rochester, Mich. Booth C237. Tube fabricating and bending welded steel tubing.

B

Babcock & Wilcox Tube Co., New York City. Booth F314. Welded and seamless steel tubing.

Baird Associates, Inc., Cambridge, Mass. Booth H427. Laboratory instruments, spectrographs, gas analyzers.

AJAX Induction Furnaces—

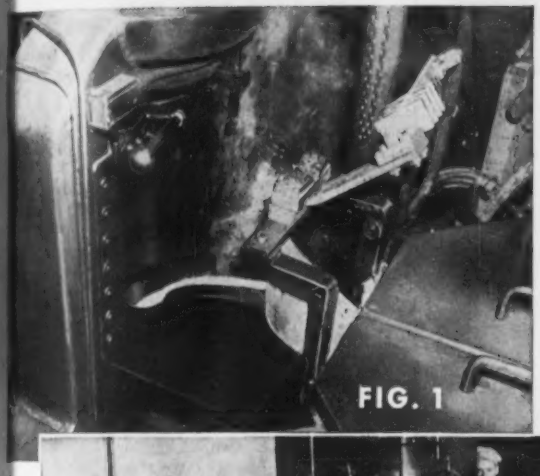


FIG. 1

helps HOOVER to cut die-casting costs by efficient melting and pumping of Aluminum

CASE HISTORY

COMPANY: The Hoover Company, Kingston-Conley Division, Cambridge, Ohio, plant.

PROBLEM: To conserve scarce copper supply by use of aluminum as a substitute. To cut die-casting costs in the manufacture of squirrel cage induction motor rotors without sacrificing performance characteristics.

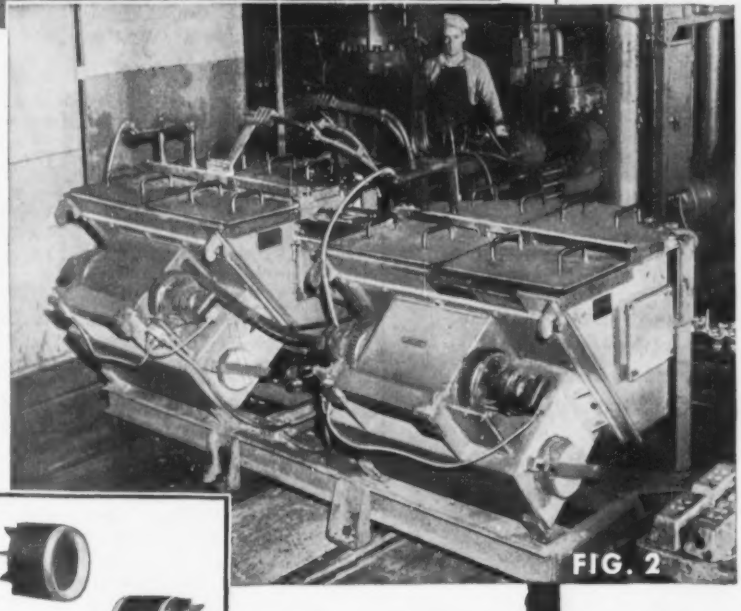


FIG. 2

SOLUTION: Installation of the LOEWY-HYDROPRESS die-casting system, in which several sizes with various end ring designs are made in same die by simple change of inserts. AJAX INDUCTION FURNACE AND ELECTROMAGNETIC PUMP used to melt and pump high-purity aluminum. Low frequency induction principle with precise controls keeps metal at constant temperature. Automatic electromagnetic pump discharges exact amount needed to fill die, eliminating hand ladling.

RESULTS: Combined melting and die-casting set-up so excellent that the Hoover plant converted completely to aluminum die-cast type within 2½ months.

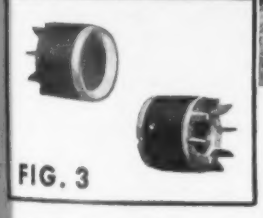


FIG. 3

Fig. 1 shows nozzle of AJAX electromagnetic pump discharging metal into cold chamber of die-casting machine

Fig. 2 shows AJAX melting furnace and electromagnetic pump installed in front of die-casting machine

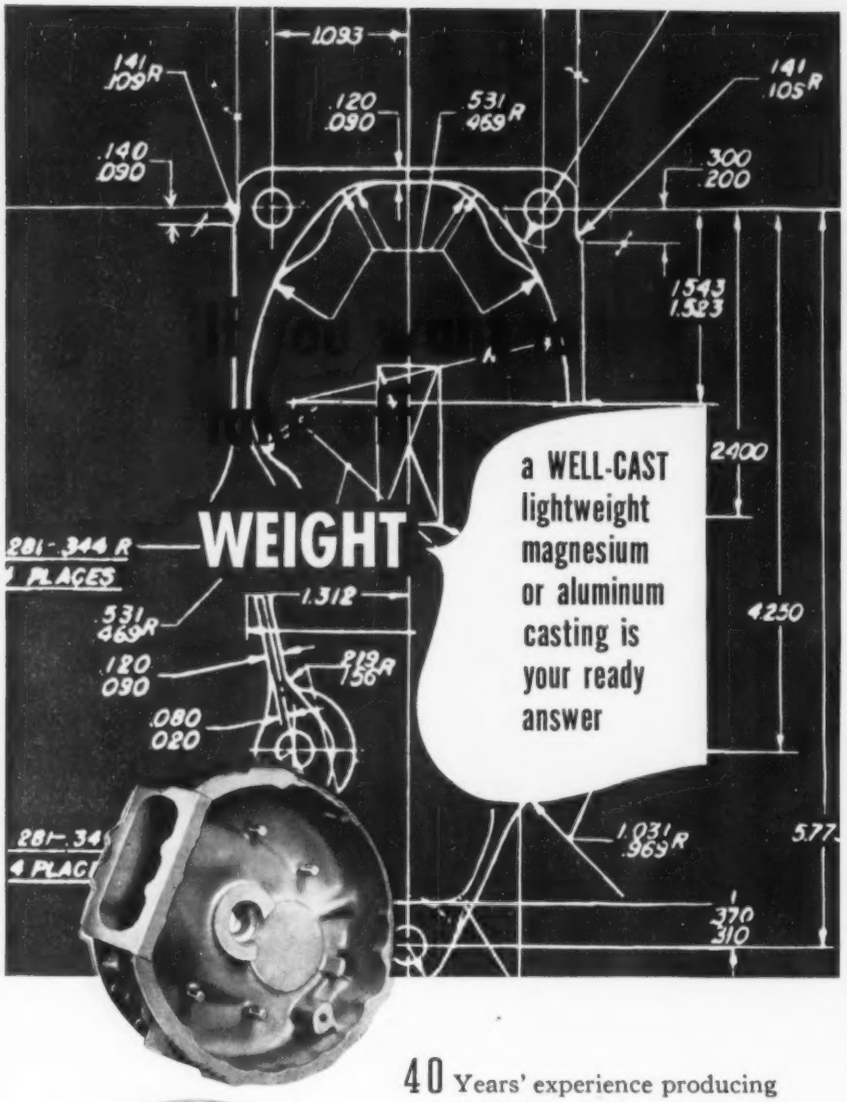
Fig. 3 shows Hoover squirrel cage aluminum cast rotors

AJAX ENGINEERING CORP., TRENTON 7, N. J.

AJAX TAMA-WYATT

INDUCTION MELTING FURNACE

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting



40 Years' experience producing quality lightweight castings for the aircraft, textile, pneumatic tool, automotive, domestic appliance, and other diversified industries everywhere.

Well-Made Wood and Metal Patterns
Ampco Bronze Castings

THE WELLMAN BRONZE & ALUMINUM CO.

2521 EAST 93rd STREET • CLEVELAND, OHIO

Exhibitors

Bakelite Division, Union Carbide & Carbon Corp., New York. Booth F322. Plastics and molding materials.

Baker & Co., Inc., Newark, N. J. Booth A363. Industrial and laboratory furnaces; laboratory ware, electrical contacts.

Baldwin-Lima-Hamilton Corp., Philadelphia. Booth D311. Metalworking presses; universal testing machines; tensile, fatigue, and impact machines; strain gages.

Banner Manufacturing Co., Milwaukee. Booth H302. Welding and brazing equipment.

Bausch & Lomb Optical Co., Rochester, N. Y. Booth B102. Microscopes and metallographic equipment; spectrographic accessories.

Bell & Gossett Co., Morton Grove, Ill. Booth A308. Pumps; heat exchangers.

Bernard Welding Equipment Co., Chicago. Booth H220. Weld cleaning hammer; electrode holders; welding clamps.

Blakeslee & Co., Cicero, Ill. Booth A250. Metal washers and degreasers.

Boice-Crane Co., Toledo. Booth A141. Drilling, tapping and woodworking machinery.

Bowser, Inc., Fort Wayne, Ind. Booth A209. Equipment for mixing and proportioning soluble and cutting oil, and for filtration and reclamation for such lubricants.

Brainard Steel Co., Warren, Ohio. Booth G151. Steel strapping, strapping tools and accessories.

Brown-Hutchinson Iron Works, Detroit. Booth A149. Steel structural work.

Bruce Products Corp., Detroit. Booth H223. Buffing and polishing wheels; metal finishing materials.

Bruning Co., Inc., Charles, Chicago. Booth F426. Printing, developing and drafting equipment.

Brush Development Co., Cleveland. Booth B147. Surface analyzers; strain analyzers, contour analyzers.

Buck Tool Co., Kalamazoo, Mich. Booth C224. Chucks.

Budd Corp., Charles, New Rochelle, N. Y. Booth H116. Safety hammers and machinists tools.

Buehler, Ltd., Chicago. Booth B131. Sample preparation equipment for the metallurgical laboratory; microtesting machines; optical equipment.

Bundy Tubing Co., Detroit. Booth D202. Tubing.

WASHINGTON STEEL CORPORATION

MicroRold Stainless Steel

WASHINGTON, PENNSYLVANIA

PHONE: WASHINGTON 5900

JOHN C. RICHARDS
GENERAL MANAGER OF SALES

October 1, 1951

YOU CAN STILL PRODUCE STAINLESS STEEL PRODUCTS

TYPE 430 IS STAINLESS STEEL

Type 430 (straight-chrome) enables many fabricators to continue production of stainless products, by consideration of its fabricating qualities and physical and chemical properties.

HAVE YOU EXPLORED THE POSSIBILITIES OF MICROROLD TYPE 430 SHEETS?

MicroRold Type 430 offers the same fabricating advantages, such as micro-accurate thinness control, uniformity of gauge, increased product yield, longer die wear and excellent surface conditions, as characterized by the MicroRold trade name.

Our warehouse distributors are available to assist you in solving application and supply problems. Write for the name of the MicroRold distributors in your area.

Yours truly,

WASHINGTON STEEL CORPORATION

John C. Richards

John C. Richards,
General Manager of Sales

In this modern plant experienced workers, operating modern equipment with the newest and most efficient quality control devices, produce Wallingford strip steel and tubing of consistently uniform quality. In analysis, gage, temper, surface finish and every other respect Wallingford Steel meets specifications exactly. Whenever you reorder, in a week, a month or a year, the same uniformly high quality will be delivered. As a result your operations never need vary, the quality of your product will be as uniform as that of Wallingford Steel.

THE WALLINGFORD STEEL CO.

SINCE 1922

WALLINGFORD, CONNECTICUT, U.S.A.

LOW CARBON • HIGH CARBON

ALLOY • STAINLESS • STRIP and TUBING

Exhibitors

C

Cadillac Stamp Co., Detroit. Booth H258. Dies; stamps; badges; marking and numbering machinery.

Cambridge Wire Cloth Co., Cambridge, Md. Booth C111. Wire screen, cloth and belting.

Cam-Lok Division. Booth H520. See Empire Products, Inc.

Campbell Machine Division, American Chain & Cable Co., Inc., Bridgeport, Conn. Booth A342. Abrasive cut-off machines.

Carboloy Dept., General Electric Co., Detroit. Booth F214. Cemented carbide tools, dies and wear parts.

Casting Engineers, Inc., Chicago. Booth H324. Precision investment castings.

Chicago Metal Hose Corp., Maywood, Ill. Booth C218. Flexible metal tubing and hose; expansion joints.

Chicago Rivet & Machine Co., Bellwood, Ill. Booth G214. Automatic rivet setters.

Chicago Tramrail Corp., Chicago. Booth H215. Cranes, hoists, monorail systems.

Chilton Co., Inc. Booths A256 and A138. (See *Iron Age* and *Automotive Industries.*)

Chrysler Corp. Booth G416. (See Amplex Manufacturing Co.)

Cincinnati Milling Machine Co., Cincinnati. Booth G356. Flame hardening machine; machine tools.

Cities Service Oil Co., New York City. Booth D210. Cutting and grinding oils; drawing compounds; greases; rust preventives.

Clark Instrument Co., Dearborn, Mich. Booth B143. Hardness testers.

Climax Molybdenum Co., New York City. Booth D250. Molybdenum and molybdenum alloys.

Clinton Machine Co., Warner Division, Detroit. Booth H546. (See Warner Division.)

Coast Metals, Inc., Little Ferry, N. J. Booth H426. Hard facing welding rods; castings for abrasion resistance.

Coles Cranes, Inc., Chicago. Booth F307. Mobile cranes.

Colonial Steel Division. Booth D345. (See Vanadium-Alloys Steel Co.)

Commander Mfg. Co., Chicago. Booth A159. Drills and chip breakers.

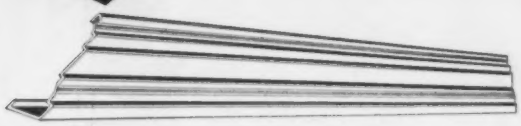
Commercial Shearing & Stamping Co., Youngstown, Ohio. Booth D321. Pressed metal products; hydraulic hoist equipment.

Commercial Steel Treating Corp., Detroit. Booth D310. Commercial heat treating.

. . . IT'S THE Cost per Cut THAT Counts

Study these high production, low cost figures on three Motch & Merryweather Circular Sawing Machines

Make your own study of the cost per cut in your metal-sawing department. Then find out from Motch & Merryweather how much production at lower cost you can get on M. & M. Circular Sawing Machines, using our Triple-Chip blades.

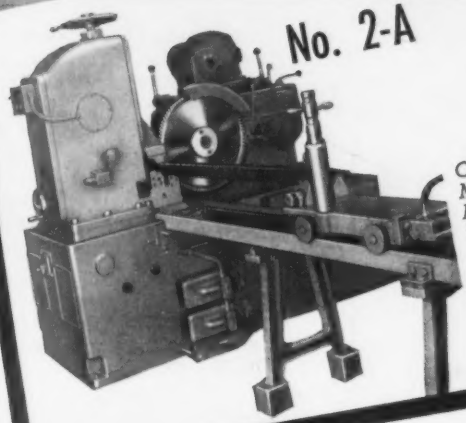


No. 00-G

Operation: Steel door frames (mitre cut).
Material: Rolled steel shapes 6" wide x 1/16" thick.
Production: 200 pieces per hour.
Tool cost per piece: $.0002.

M. & M. No. 00-G Circular Sawing Machine. Manual or automatic stock feed. Readily adaptable to making cuts at angles up to 45° as well as high production square cut-off. Capacity: up to 3" diameter round; shapes—up to 3-3/8" x 6".

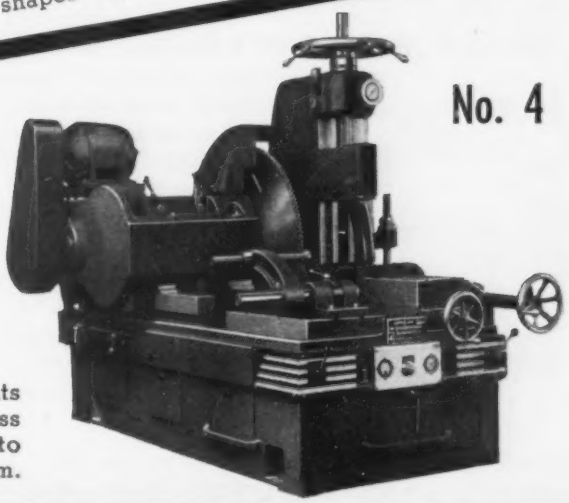
No. 2-A



Operation: Rocket nozzle stock cut to length.
Material: S. A. E. 1020, 5" diameter.
Production: 60 pieces per hour.
Tool cost per piece: $.001.

The No. 2-A machine pictured at the left has automatic stock feed up to 72" cut-off lengths. It is offered also with manual stock feed. Capacity: up to 6-1/2" diameter round; structural shapes—up to 5" x 12".

No. 4



Operation: Forging billets cut to length.
Material: S. A. E. 1045, 14" square.
Production: 6 pieces per hour.
Tool cost per piece: $.12.

No. 4. Widely used in steel and structural steel plants and forge plants sawing all types of forging, stainless and titanium alloys, die block steel, etc. Capacity: to 17" dia. round; structural shapes up to 24" I-beam.

Manufactured by

THE MOTCH & MERRYWEATHER MACHINERY COMPANY
715 PENTON BUILDING • CLEVELAND 13, OHIO
Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT

CARS,

We wrote this ad
to sell steel . . . **but**
the industry must have
scrap first.

FOLLANSBEE STEEL CORPORATION

CONTINUOUS

FEEDING

FOLLANSBEE COLD ROLLED STRIP is widely used wherever high-speed automatic machines turn out products in great numbers. Continuous feeding from coils is essential to maintaining volume like this. That's why Follansbee Cold Rolled Strip is furnished in continuous coils that keep automatics in action for real productioneering teamwork.

Follansbee Cold Rolled Strip Steel is manufactured to specifications, in tempers and finishes for most industrial applications. Let the nearby Follansbee Representative tell you about Follansbee Steel Service, tailored to fit *your needs.*

FOLLANSBEE STEEL CORPORATION

GENERAL OFFICES, PITTSBURGH 30, PA.

SEAMLESS TERNE ROLL ROOFING • COLD ROLLED STRIP
POLISHED BLUE SHEETS AND COILS

Sales Offices—New York, Philadelphia, Rochester, Cleveland, Detroit, Milwaukee. *Sales Agents*—Chicago, Indianapolis, Kansas City, Nashville, Los Angeles, San Francisco, Seattle; Toronto and Montreal, Canada. *Mills*—Follansbee, W. Va.

Follansbee Metal Warehouses—Pittsburgh, Pa., Rochester, N. Y., and Fairfield, Conn.

—Exhibitors—

Composite Die Supply Co., Detroit. Booth D112. Engraving and die supplies including die patterns, molds, etc.

Congres International des Fabrications Mecaniques, Stockholm, Sweden. Booth H519.

Continental Industrial Engineers, Inc., Chicago. Booth H345. Industrial furnaces; special machines; production lines; complete plants including buildings and all equipment.

Continuous Metalcast Corp. Booth G459. (See Scovill Mfg. Co.)

Crane Packing Co., Chicago. Booth D242. Lapping machines, tube rolling control; packings, mechanical seals; pipe joint and gasket compounds.

Cro-Plate Co., Inc., Hartford, Conn. Booth G122. Plating, cleaning, and surface finishing equipment and processes.

Crucible Steel Co. of America, New York City. Booth G310. High speed toolsteel; alloy, stainless and special purpose steels.

Dake Engine Co., Grand Haven, Mich. Booth F416. Hydraulic industrial presses.

Deepfreeze Distributing Corp., Cincinnati, Ohio. Booth H254. Low temperature equipment.

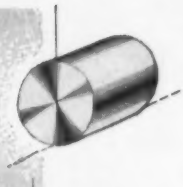
Delaware Tool Steel Corp., Wilmington, Del. Booth C211. Controlled atmosphere furnace.

Delta Power Tool Div., Rockwell Mfg. Co., Milwaukee. Booth A319. Metalworking and woodworking machine tools; spot and arc welders; lathes.

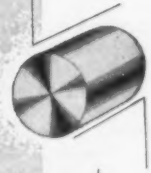
Turn to Page 268

Unwavering Right-Line Rotation...
No Skew...No Side Shock...
No Roller End Drag

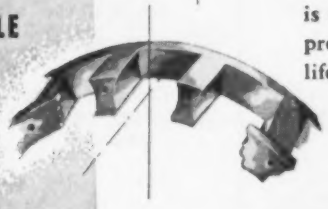
RIGHT-ANGLE
ROLLER ENDS, precisely square to avoid end-rub, oscillation and side-shock.



RIGHT-ANGLE
BEARING SURFACES with parallelism that results in unwavering rightline rolling.



RIGHT-ANGLE
SEPARATOR SLOTS accurately machined to prevent roller skew, slide and uneven wear.



Test Rollway Maximum-Type Cylindrical Roller Bearings with your finest gauges. Notice that the bores are precisely cylindrical and that the surfaces of the separators are parallel to each other. The roller ends themselves are truly square on every diameter, and the bearing surfaces match the parallelism of both the separator slots and the roller races.

Line for line and surface for surface, each maximum-type Rollway Bearing is a beautiful piece of related precision and right-angle trueness. Each is precision-engineered for quieter running, lower friction losses and longer life-expectancy under specific conditions of maximum service.

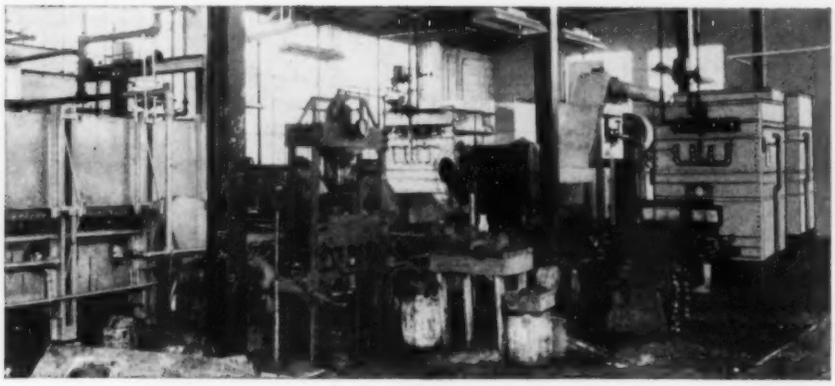
Our engineers will gladly help you select bearings for particular applications. No cost. No obligation. Just write Rollway Bearing Co., Inc., Syracuse 4, N.Y.

SALES OFFICES

SYRACUSE
PHILADELPHIA — BOSTON
PITTSBURGH
CLEVELAND — DETROIT
HOUSTON — LOS ANGELES

ROLLWAY BEARINGS

Complete Line of Radial and Thrust Cylindrical Roller Bearings



Niagara Aero Heat Exchanger quickly pulls down the initial peak load of heat in quenching . . . and saves cooling water

Accurate control of quench bath temperatures and quickly effective capacity to handle the initial peak load of heat in quenching prevents production set-backs, increases the output of your heat treating department, prevents oil fires, saves you losses from rejected parts.

Niagara Aero Heat Exchangers give you this control in both furnace and induction hardening methods. They prevent both over-heating and over-cooling of the quench bath. Hundreds of heat treaters know they prevent many troubles, constantly improve quality and increase production.

They quickly pay for themselves by saving cooling water coils and extend your quench capacity without extra water or cooling tower.

Write for Bulletin #120 giving complete information.

Visit Niagara's Booth G-422, National Metal Exposition

NIAGARA BLOWER COMPANY

Over 35 Years' Service in Industrial Air Engineering

Dept. IA, 405 Lexington Ave. New York 17, N. Y.

Experienced District Engineers in all Principal Cities

—Exhibitors—

Detrex Corp., Detroit. Booth G381. Cleaning and degreasing equipment; cleaning compounds, and solvents.

Detroit Edison Co., Detroit. Booth F461. Public utilities.

Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich. Booth A260. Electric melting furnaces.

Detroit Testing Machine Co., Detroit. Booth B127. Tensile and ductility testers; Brinell machines.

Diamond Iron Works, Inc. Booth H236. (See Mahr Mfg. Co.)

Die Casting. Booth G440. (See *Industry & Welding.*)

Dietert Co., Harry W., Detroit. Booth B244. Carbon and sulphur determination equipment; Brinell reader; sand, core, and mold testing equipment for the foundry.

Distillation Products Industries, Division of Eastman Kodak Co., Rochester, N. Y. Booth D236. Vacuum systems and furnaces; pumps; gages.

Diversey Corp., Chicago. Booth G346. Metal cleaning compounds.

Diversified Metal Products Co., Los Angeles, Calif. Booth H224. Machine tools and equipment.

DoAll Co., Des Plaines, Ill. Booth H305. Sawing, filing, and grinding equipment; gages, chucks, automatic selecting equipment.

Dow Chemical Co., Midland, Mich. Booth F222. Magnesium; magnesium alloy products.

Dow Furnace Co., Detroit. Booth A349. Controlled atmosphere furnaces, gas cyaniding.

Drever Co., Philadelphia. Booth C229. Industrial metal treating furnaces; ammonia dissociators and other atmospheric equipment.

Driver Co., Wilbur B., Newark, N. J. Booth A305. Electrical resistance alloys in rod, wire and strip form.

Du Pont de Nemours & Co., E. I. Wilmington, Del. Booth F356. Electroplating and surface finishing equipment; chemicals and supplies.

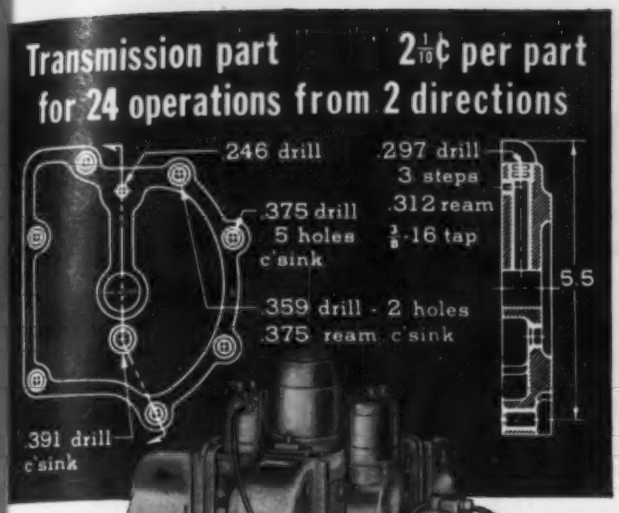
E

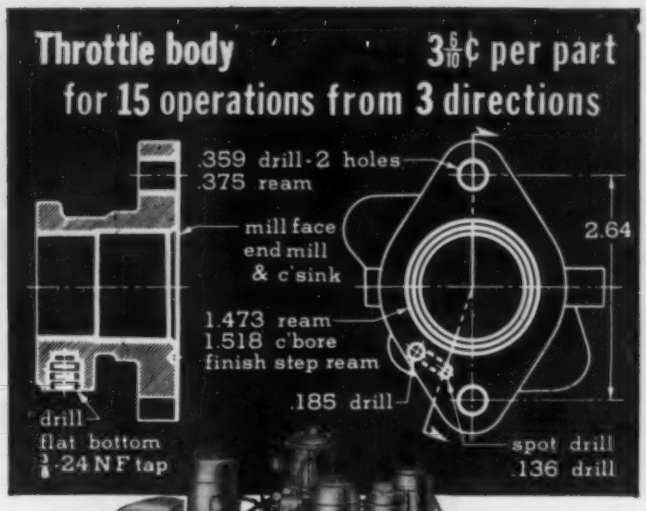
Eastman Kodak Co. Booth D236. (See Distillation Products Ind. Div.)

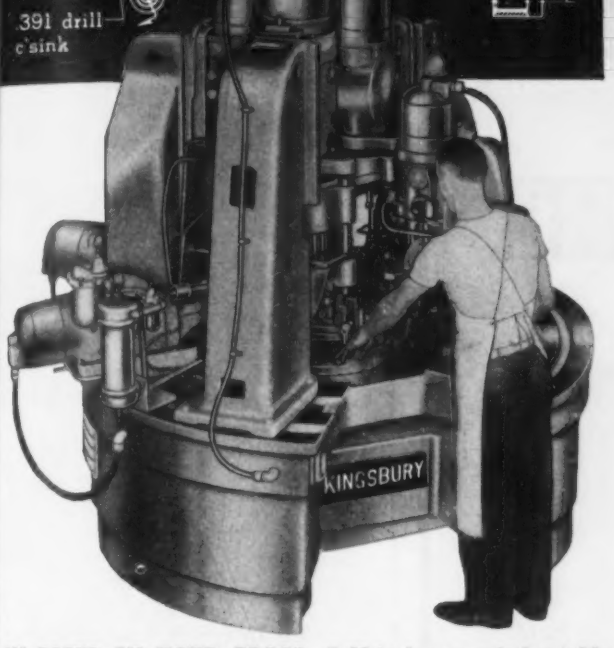
East Shore Machine Co., Cleveland. Booth H111. Keyway broaches.

Eaton Mfg. Co., Reliance Division, Massillon, Ohio. Booth H357. Spring lock washers; cold finished steel.

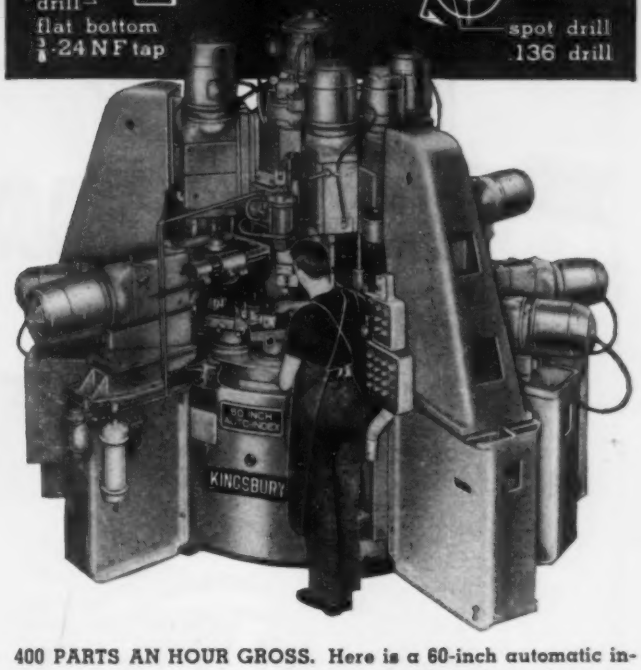
Eclipse Fuel Engineering Co., Rockford, Ill. Booth G162. Gas burners; air-gas mixers; valves; pressed steel pots; furnaces and boilers.







305 PARTS AN HOUR GROSS. A 20-inch power index table has eight fixtures. Three horizontal units drill .297 in steps for a short time cycle. Two others ream and tap. Four vertical units with multi-spindle heads do the nine holes in the left view.



400 PARTS AN HOUR GROSS. Here is a 60-inch automatic indexing machine, the largest size we build (and ever hope to). It has one angular and four horizontal units on knees that are bolted to the base and six vertical units on the central column.

many standard machines

At station 7 a vertical unit reams the throttle bore 1.473.

At station 9 a vertical unit finish step reams the throttle bore and a horizontal unit flats the bottom of the tapped hole.

At station 10 a 2-spindle vertical unit reams two holes .375 and a horizontal unit taps 3/8-24.

At station 11 on his right a vertical unit with a combination tool end mills the face to remove tool marks and countersinks the throttle bore.

All that takes 7.4 seconds. Indexing takes 1.6 seconds. So the total time cycle is (theoretically) 9.0 seconds. That means a gross production of 400 parts an hour (3600 secs. ÷ 9 secs.).

This machine has no units at stations 5 and 8, so our customer can add operations if the product should change. On any Kingsburys you can relocate units and change speeds and feeds. Compared to general purpose machines they are not too flexible.

But their output is just terrific.

Sincerely,

Kingsbury Machine Tool Corp.
96 Laurel Street, Keene, N. H.

Each unit cost on the drawings includes the cost of the man and of the machine - no power or overhead. We assumed:

Unit cost of the man equal to:

$$\frac{\text{average U.S. hourly wage}}{\text{hourly gross} \times 80\% \text{ efficiency}}$$

Unit cost of the machine to be:

$$\frac{\text{price of tooled machine}}{\text{output in 6000 hrs. @ 80\% eff.}}$$

KINGSBURY

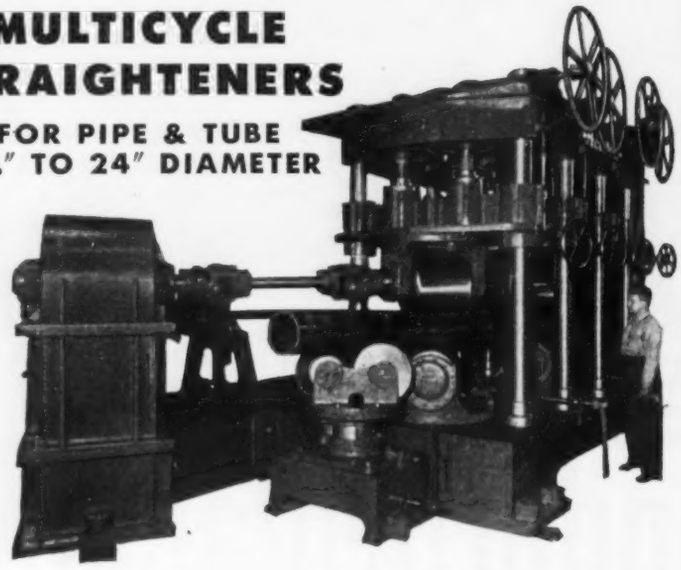
AUTOMATIC DRILLING & TAPPING MACHINES
for Low-Cost High Production

Straighten Pipe & Tube Up To 24" At High Speed

MEDART

MULTICYCLE STRAIGHTENERS

FOR PIPE & TUBE 1/16" TO 24" DIAMETER



THERE IS A DIFFERENCE IN STRAIGHTENERS! Only the Medart Multicycle offers a double straightening cycle, imposed by two bending stations to insure end-to-end straightness.

GENTLER HANDLING OF PIPE WALL! For large thin wall pipe or tubing the Multicycle employs dual-type bending rolls to distribute the straightening load around the tube circumference and eliminate usual single point high pressure concentration.

UNBALANCED TWISTING TORQUE ELIMINATED! Both top and bottom feed rolls are driven on the Medart Multicycle for balanced torque about the neutral axis of the workpiece.

SINGLE DRIVING MOTOR! Only one driving motor is required, insuring positively synchronized roll speed, longer roll life.

NO RUBBING GUIDES! All guiding action is accomplished by rollers mounted in anti-friction bearings — no friction or shoe-type guides are required.

COMPARE THE MULTICYCLE ADVANTAGES! Also straightens solid rounds — motorized setup adjustment on larger models — all gears running in oil — Timken bearing equipped throughout — many other patented features.

Write for Catalog

THE MEDART COMPANY 3535 DeKALB ST. ST. LOUIS 18, MO.

— Exhibitors —

Elastic Stop Nut Corp. of America, Union, N. J. Booth D223. Stop nuts and self-locking fasteners.

Eldorado Mining & Refining Ltd., Ottawa, Canada. Booth H118. Radiography sources utilizing radium and cobalt-60. Remote control manipulators for handling radioactive materials. Radioactive isotopes.

Electric Furnace Co., Salem, Ohio. Booth F405. Gas-fired, oil-fired and electric heat treating furnaces; controlled atmosphere equipment.

Electric Products Co., Cleveland. Booth H202. Motor generators and special electric equipment.

Electro-Alloys Div. Booth F339. (See American Brake Shoe Co.)

Electro-Arc-Mfg. Co., Detroit. Booth H508. Electrical tap extractor and driller.

Elgin National Watch Co., Industrial Products Div., Elgin, Ill. Booth H235. Abrasive diamond products; sapphire products; spring alloy.

Elox Corp. of Michigan, Clawson, Mich. Booth G239. Tapping tools; tap extractor.

Empire Products Inc. Cincinnati, Ohio. Booth H520.

Engelhard Industries. Booths A363, A301 and G240. (See Baker & Co., D. E. Makepeace Co., American Platinum Works.)

Engineered Castings Div. Booth F339. (See American Brake Shoe Co.)

Engis Equipment Co., Chicago. Booth B223. Instruments and diamond compounds.

Ercona Corp., New York City. Booth B243. Scientific instruments.

Erico Products, Inc., Cleveland. Booth H158. Cable splicing processes.

Eutectic Welding Alloys Corp., New York City. Booth F403. Welding rods and electrodes.

F

Fahralloy Co., Harvey, Ill. Booth H151. Stainless steel and heat resistant castings.

Fawick Airflex Co., Inc., Cleveland. Booth G251. Industrial clutches and seals; valves; brakes.

Ferner Co., Inc., R. Y., Boston, Mass. Booth B218. Fatigue testing machine; metallurgical microscopes; portable hardness testers.

Firth Sterling Steel & Carbide Corp., Pittsburgh. Booth G446. Tool and stainless steels; sintered carbides; carbide-tipped tools.

Fiske Brothers Refining Co., Lubriplate Division, Newark, N. J. Booth C232. Oils and greases; cutting compounds.

Turn to Page 276

DoALL Gage Blocks

1. You get measurements in millionths of an inch!

2. You can "build" a gage in a matter of minutes!

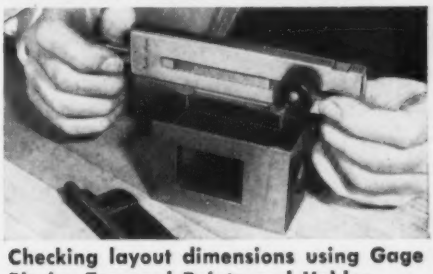
3. You cut no metal — waste no material!

Checking your working gages — micrometers, calipers, snap gages, etc.

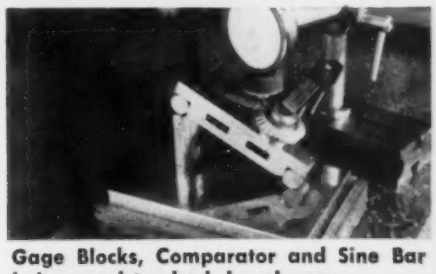
Go and no-go gages are quickly and inexpensively set up for checking parts.

Height Gages for checking heights and bore diameters.

Scriber Point scribes straight lines with absolute accuracy.



Checking layout dimensions using Gage Blocks, Trammel Points and Holder.



Gage Blocks, Comparator and Sine Bar being used to check bevel gear.

Checking machine settings and milling operations.

Checking fixed gages and snap gages with DoALL Gage Blocks.

Gage Blocks combined to check an adjustable snap gage.

Take time pieces for example . . .

Westclox
Elgin National Watch Co.
Hamilton Watch Co.
Gruen Watch Company

Benrus Watch Company
Bulova Watch Company
Minneapolis Honeywell Regulator Co.

U. S. Time Corp.
Telechron
International Business Machines Corp.

These are producers of highest quality products whose basic manufacturing accuracy is controlled by DoALL Gage Blocks.

The list of DoALL Gage users is the roster of production achievement.

DoALL

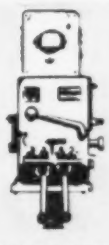
Sales-Service Stores in All Principal Centers

CH FILER

CARBIDE TOOL GRINDER

TOOLMAKER'S LATHE

SAW BANDS



BLADE WELDER

"See us at the METAL SHOW"
Detroit
OCTOBER 5-19
Booth H-305

For Your
Metal-Finishing Needs...
OCTAGON
Phosphating Compounds
...Select from
OCTAGON'S complete line...

ANCHORITE 100
- A corrosion resistant phosphating base for paint.
- Meets Army Spec. No. 57-0-2C, Type II, Class C.

RUSTSHIELD 2
- Used for friction surfaces of moving parts; oil-retentive, prevents galling and freezing.
- Meets Army Spec. No. 57-0-2C, Type II, Class A.

PROTECTORITE
- Rustproofing.
- Meets Army Spec. No. 57-0-2C, Type II, Class B.

ANCHORITE 200
- A cleaning phosphating compound.
- Where only light oil and dirt present, no degreasing necessary.

RUSTCLEAN 12 AND 15
- For removal of rust, scale, flux and preparation for paint.

Write for Free Booklet on Anchorite 100

OCTAGON OCTAGON

OCTAGON PROCESS INCORPORATED
18 BANK STREET, STATEN ISLAND 1, N. Y. (Cable Address: OCTAPRO)

READ
THE
ADVERTISING
PAGES
- Equipment
- Materials
- Services

Sources for every need in the Metalworking industry.
THE IRON AGE

Exhibitors

Flow. Booth G440. (See Industrial Publishing Co.)

Foerster Institut, Wurttemberg, Germany. Booth B136. (See Institut Dr. Foerster.)

Freedom-Valvoline Oil Co., Freedom, Pa. Booth H244. Lubricating oils and greases; rust preventives.

Frontier Bronze Corp., Niagara Falls, N. Y. Booth B203. Bronze, aluminum and monel sand castings; aluminum alloy tubing and extrusions.

G

Galileo Corporation of America, Inc. Booth B138. (See Opplem Co.)

Gas Appliance Service, Inc., Chicago. Booth G158. Gas-air mixers; high speed burners; small furnaces; air heaters.

Gehringer & Forsyth, Detroit. Booth D140. Sales & service engineers for metal industry. (See also Standard Alloy Co., Rolock, Inc., and Ashworth Bros., Inc.)

General Alloys Co., Boston, Booth A336. Heat resisting alloy castings and furnace mechanisms; stainless steel castings.

General Aniline & Film Corp. Booth G451. (See Ozalid Div.)

General Controls Co., Glendale, Calif. Booth G164. Automatic temperature, pressure and level controls.

General Electric Co., Schenectady, N. Y. Booth A102. Testing and inspection equipment; welding equipment; furnaces.

General Electric X-Ray Corp., Milwaukee. Booth F250. X-ray and radiographic equipment.

General Plate Co. Booth D109. (See Metals & Controls Corp.)

Goodrich Co., B. F., Akron, Ohio. Booth C212. Rivnut blind fasteners.

Gordon Co., Claud S., Chicago. Booth H352. Heat treating furnaces; temperature indicating and control instruments.

Graham Mfg. Corp., Ferndale, Mich. Booth H257. Stud welders and contract welding.

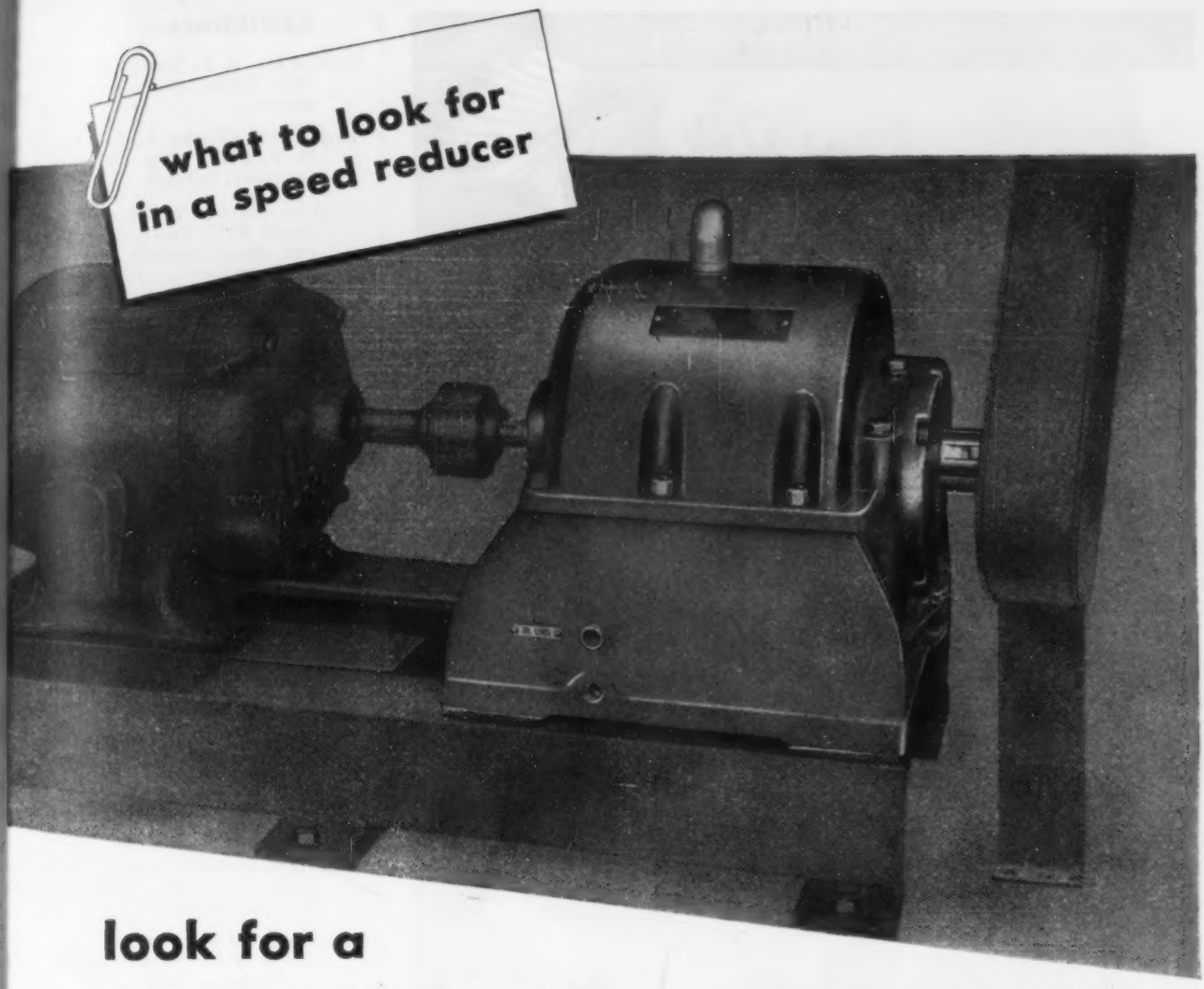
Gray-Grimes Tool Co., Detroit. Booth H154. Boring chucks, machine tool accessories and fittings.

Gulf Oil Corp., Pittsburgh. Booth D230. Petroleum products—lubricants, cutting and quenching oils.

H

H & H Research Co., Detroit. Booth A205. Reciprocating action tools and accessories; surface plates, toolholders.

H & H Tube & Mfg. Co., Detroit. Booth D314. Seamless brass and copper tubing; lockseam tubing; strip.



look for a

Dependable Gear Assembly

Tough, impact-resisting gears are the foundation for the dependable operation of Westinghouse Speed Reducers. Each gear is made from BPT Taper-Hardened Gear Steel, combining carefully selected material with an exclusive Westinghouse heat-treating process. Result is gearing with a hard, wear-resistant surface that tapers evenly to a tough, ductile core. Teeth will not chip, crack or spall.

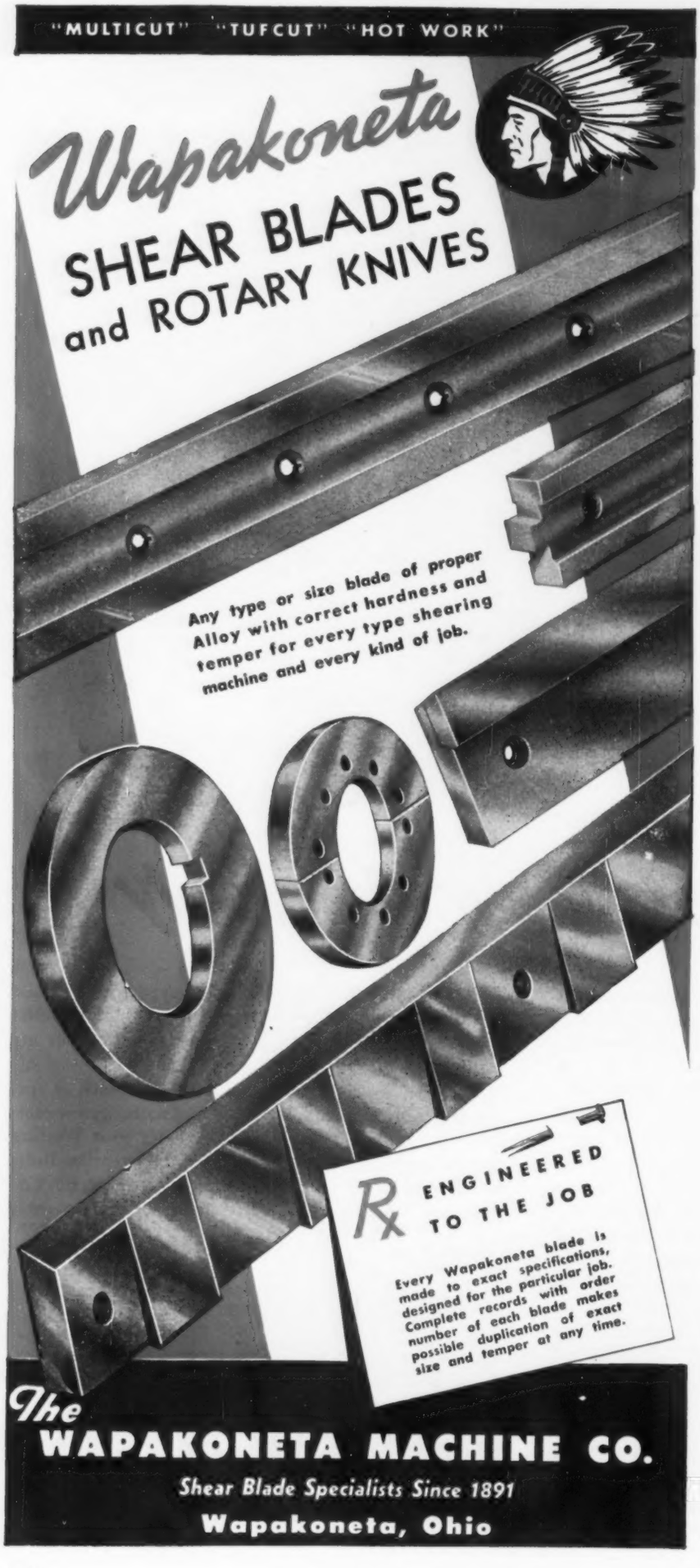
Further dependability is provided by the *accuracy* of Westinghouse Gears. Teeth are cut by the hobbing process—recognized as the most accurate method of gear cutting. Tooth contours are precise and highly finished. Operation is smooth and quiet. The single helical design distributes load evenly, with uniform tooth deflection—large tooth contact area—long life with minimum wear.

You get such a dependable gear assembly in the new Westinghouse "DB" Speed Reducer pictured above. This concentric shaft, split housing-type speed reducer fills the bill where floor space is limited. Construction permits straight-line mounting of speed reducer and prime mover.

There's a Westinghouse product to meet each of your gearing requirements — speed reducers, gearmotors, high-speed units, open gearing. Contact your Westinghouse representative for a copy of Descriptive Bulletin 3700-ISR. Or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania.

J-07302

YOU CAN BE SURE... IF IT'S
Westinghouse
GEARED DRIVES


"MULTICUT" "TUFCUT" "HOT WORK"
Wapakoneta
SHEAR BLADES
and ROTARY KNIVES
Any type or size blade of proper Alloy with correct hardness and temper for every type shearing machine and every kind of job.
Rx ENGINEERED TO THE JOB
Every Wapakoneta blade is made to exact specifications, designed for the particular job. Complete records with order number of each blade makes possible duplication of exact size and temper at any time.
The WAPAKONETA MACHINE CO.
Shear Blade Specialists Since 1891
Wapakoneta, Ohio

Exhibitors

Holden Co., A. F., Detroit. Booth F406. Salt baths; heat treating furnaces.

Hones, Inc., Charles A., Baldwin, L. I., N. Y. Booth G265. Gas-fired oven furnaces; burners.

Hoskins Manufacturing Co., Detroit. Booth F217. Resistance wire; special alloys; electric heat treating furnaces.

Houghton & Co., E. F., Philadelphia. Booth F306. Cutting oils, heat treating compounds; metal cleaners.

Howard Foundry Co., Chicago. Booth C138. Castings, sand and permanent mold, of aluminum, brass, bronze, magnesium, and semi-steel.

I

Illinois Testing Laboratories, Inc., Chicago. Booth B224. Temperature, air and dew point measuring instruments.

Industrial Cable & Sling Co., Detroit. Booth H251. Wire-rope and chain fittings.

Industrial Heating. Booth C239. (See National Industrial Publishing Co.)

Industrial Gas Div. Booth D114. (See Liquid Carbonic Corp.)

Industrial Heating Equipment Co., Detroit. Booth D320. Burners; heat treating furnaces.

Industrial Press, New York City. Booth H128. Trade papers and engineering data.

Industrial Publishing Co., Cleveland. Booth G440. Publications—*Industry and Welding; Die Castings; Flow; Applied Hydraulics.*

Industry and Welding, Cleveland. Booth G440. (See Industrial Publishing Co.)

Institut Dr. Foerster, Wurttemburg, Germany. Booth B136. Equipment for nondestructive and electronic testing.

International Nickel Co., Inc., New York City. Booth A328. Nickel and nickel alloys; nickel steel and cast iron; stainless steels.

Invincible Vacuum Cleaner Mfg. Co., Dover, Ohio. Booth H123. Welding flux recovery equipment.

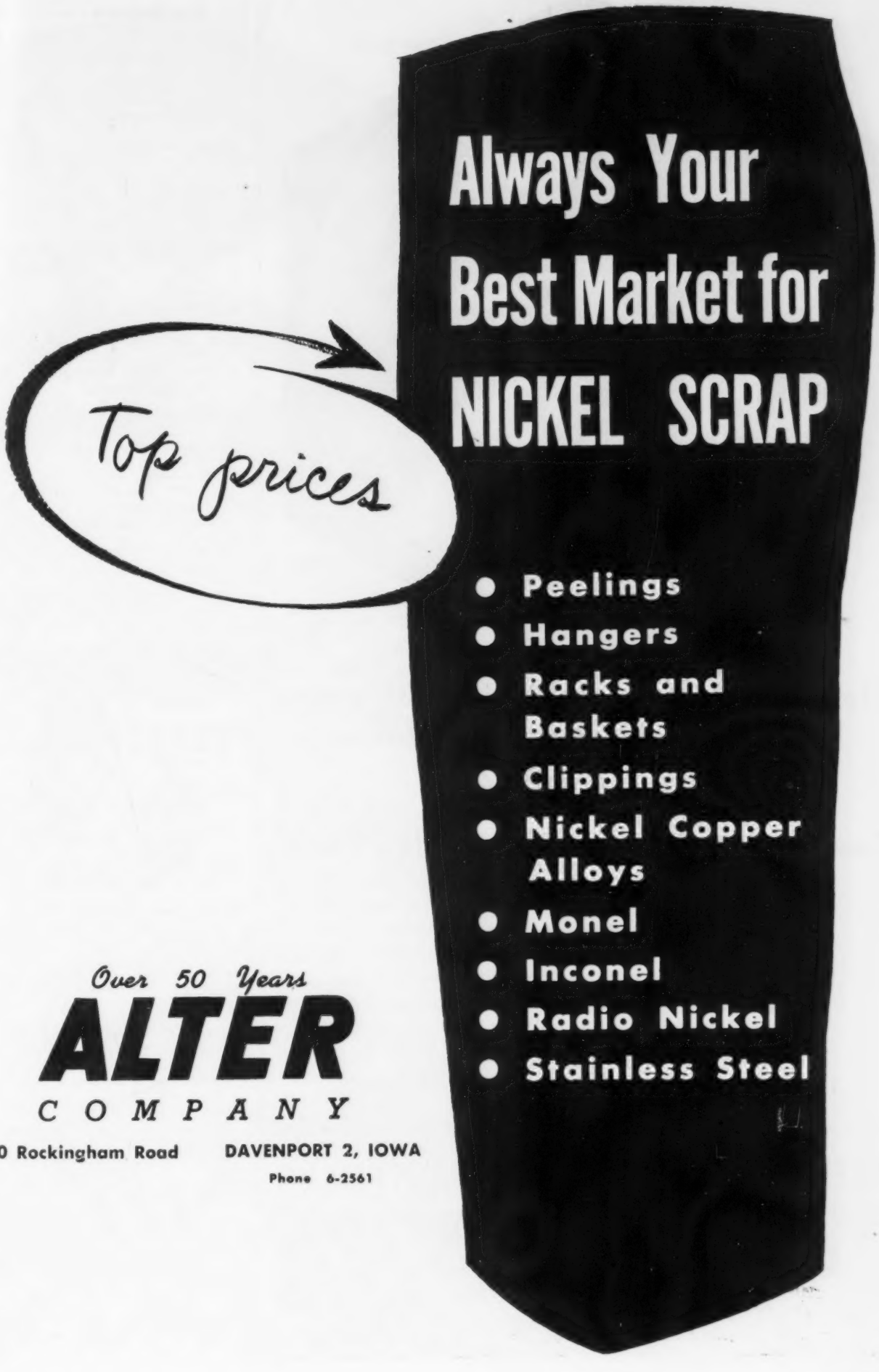
Ipsen Industries, Inc., Rockford, Ill. Booth F360. Automatic heat treating units; generators.

Iron Age, New York City. Booth A138. Magazines and reprints.

J

Janney Cylinder Co., Philadelphia. Booth G315. Finish-machined products made from centrifugal castings of ferrous and nonferrous alloys.

Jarrell-Ash Co., Boston. Booth B111. Precision scientific apparatus.


Always Your
Best Market for
NICKEL SCRAP
Top prices
● Peelings
● Hangers
● Racks and Baskets
● Clippings
● Nickel Copper Alloys
● Monel
● Inconel
● Radio Nickel
● Stainless Steel
Over 50 Years
ALTER
COMPANY
1700 Rockingham Road DAVENPORT 2, IOWA
Phone 6-2561

Cleveland has specialized for 35 years in making a few items well—

Top Quality

Cap Screws • Set Screws • Milled Studs

Specialization at "Cleveland Cap" guarantees closer attention to accurate production, rigid inspection, and prompt shipment (as conditions permit). Our capacity is concentrated on standard Cap Screws in an unusually wide range of sizes—all popular heads; square head Set Screws, and Milled Studs. We also have capacity for producing your special design headed and threaded parts by cold extrusion. See your jobber for *standard* items; write us about your "specials."

THE CLEVELAND CAP SCREW COMPANY

2917 East 79th Street, Cleveland 4, Ohio

Warehouses: Chicago • Philadelphia • New York • Providence

CLEVELAND *Top Quality* FASTENERS

originators of the Kaufman DOUBLE EXTRUSION Process

Ask your jobber for Cleveland Fasteners

Exhibitors

Jelliff Mfg. Corp., C. D., Southport, Conn. Booth G352. (See Kanthal Corp.)

Jensen Specialties, Inc., Detroit. Booth D215. Electric ovens.

Johansson Gage Co., C. E., Detroit. Booth B226. Gage blocks.

Johnson & Son, Inc., S. C., Racine, Wis. Booth G316. Protective wax coatings for metals.

Jones Co., C. Walker, Philadelphia. Booth A145. Industrial work gloves.

K

K. S. M. Products, Inc., Stud Welding Division, Merchantville, N. J. Booth G321. Equipment for stud welding process.

Kalamazoo Tank & Silo Co., Kalamazoo, Mich. Booth F416. (See Marvin Machine Products Co.)

Kanthal Corp., Southport, Conn. Booth G352. Electric resistance wire; high-temperature alloys. Heating elements and resistance alloys.

Kearney & Trecker Corp. Booth A240. (See Walker-Turner Div.)

Kelit Products, Inc., Los Angeles. Booth H253. Metal cleaning materials.

Kemp Mfg. Co., C. M., Baltimore, Md. Booth G144. Industrial gas carburetors; gas burners; immersion heating.

Kennametal, Inc., Latrobe, Pa. Booth G252. Metal cutting tools; wear resistant parts.

Kentucky Agriculture & Industrial Development Board. Frankfort, Ky. Booth H155. Industrial Development of Kentucky.

Kerns Co., L. R., Chicago. Booth A119. Industrial lubricants.

Keuffel and Esser Co., Detroit. Booth H206. Copying, reproducing and drafting equipment and supplies.

King, Andrew, Narberth, Pa. Booth B122. Portable Brinell hardness tester.

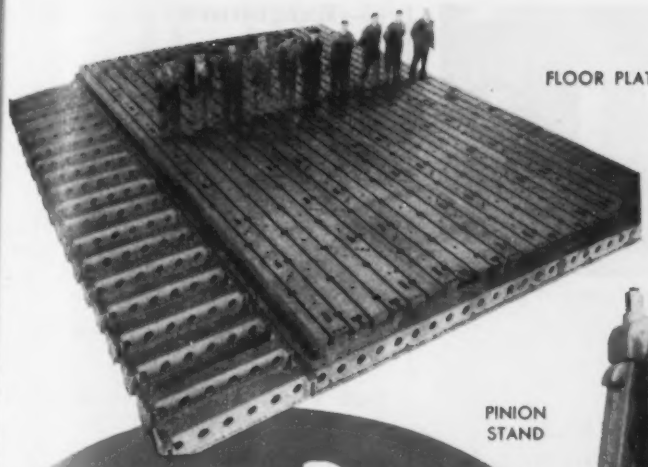
Kold-Hold Manufacturing Co., Lansing, Mich. Booth G345. Plate-coils which replace pipe coils for heating or cooling tanks.

Kolene Corp., Detroit. Booth A315. Cleaning process for removal of oxide scale and other impurities at the surface of metals.

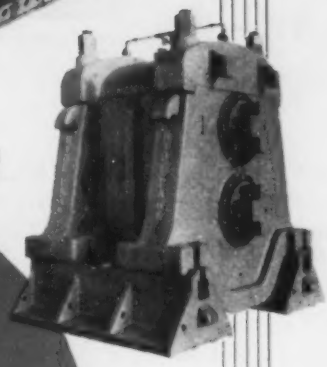
Kropp Forge Co., Chicago. Booth D222. Flat die, drop forge and upset forgings.

Kuhlman Electric Co. Booth A260. (See Detroit Electric Furnace Div.)

Kux Machine Co., Chicago. Booth A122. Die-casting machines; powder metal presses.

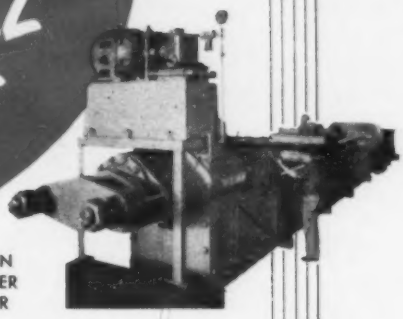


FLOOR PLATE

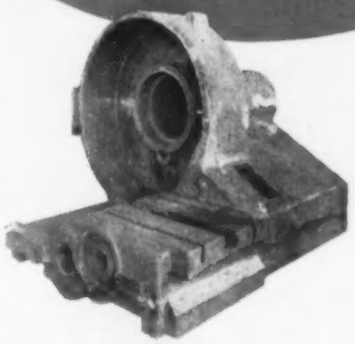


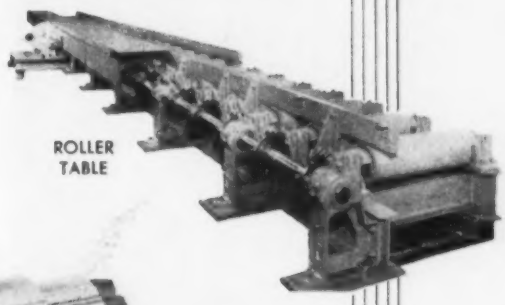
PINION STAND

Hyde Park ROLLS AND ROLLING MILL EQUIPMENT



500 TON STRETCHER LEVELLER





ROLLER TABLE

HEAVY MACHINE TOOL CASTING

FOR over fifty years Hyde Park has had the privilege of making Rolls and Rolling Mill Machinery for many of the leading mills of the nation.

Hyde Park Red Circle Rolls lead in dependable performance and long service. There is a Red Circle Roll for every purpose.

Hyde Park Rolling Mill Equipment saves maintenance costs through higher sustained efficiency.

ROLLS

- Alloy Iron
- Chilled Iron
- Sand and Chilled Iron

ROLLING MILL EQUIPMENT

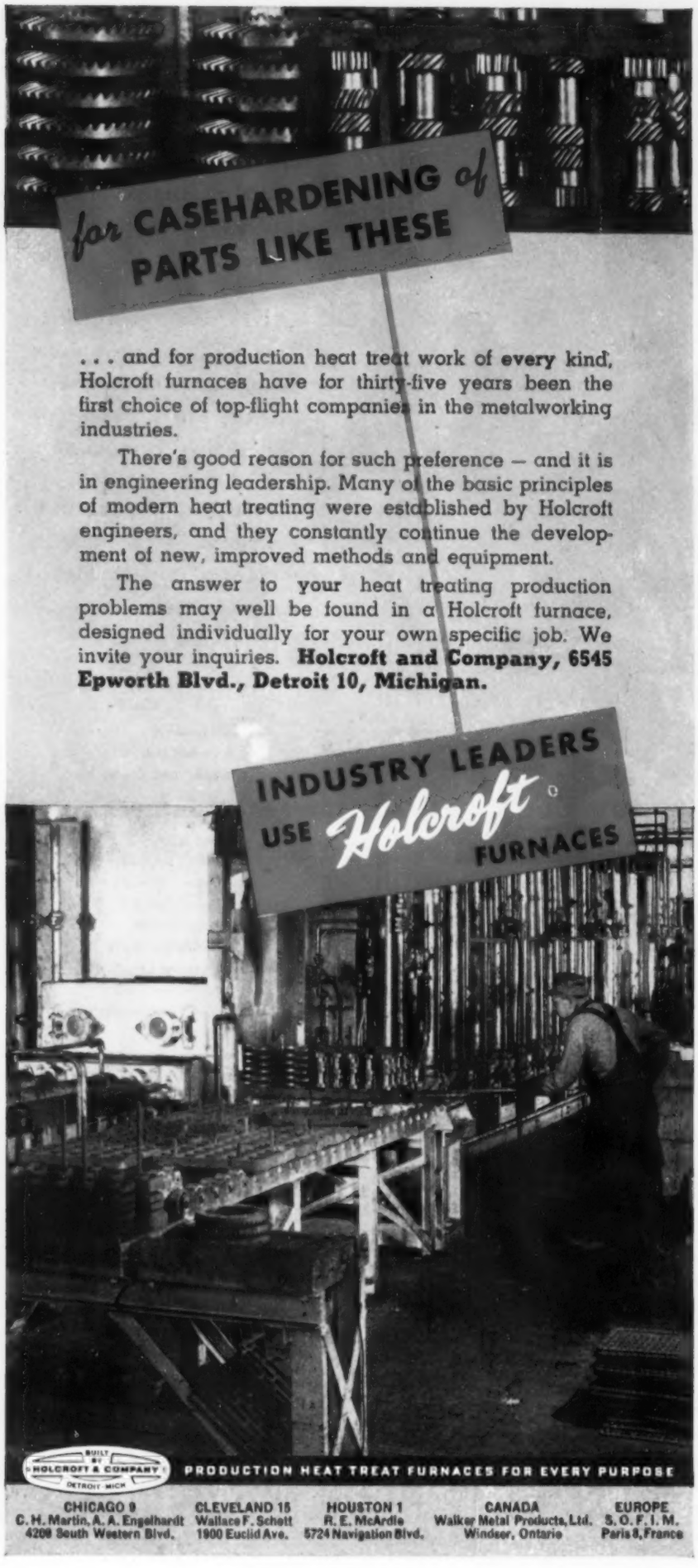
- Bar Mills
- Merchant Mills
- Sheet and Strip Mills
- Pinion Stands
- Roller Tables
- Reduction Drives
- Stretcher Levellers
- Guillotine Shears
- Sheet Mill Shears
- Roll Lathes
- Special Machinery
- Machine Work

GRAY IRON CASTINGS
Up To 80,000 Lbs.

- Machinery Castings
- Lathe Beds
- Housings
- Pinion Housings
- Mill Housings
- Shoe Plate
- Lay-out Plates
- Surface Plates

RED CIRCLE Rolls ALLOY-CHILLED

HYDE PARK FOUNDRY & MACHINE CO.
HYDE PARK, WESTMORELAND CO., PA.


for CASEHARDENING of
PARTS LIKE THESE
. . . and for production heat treat work of every kind, Holcroft furnaces have for thirty-five years been the first choice of top-flight companies in the metalworking industries.
There's good reason for such preference — and it is in engineering leadership. Many of the basic principles of modern heat treating were established by Holcroft engineers, and they constantly continue the development of new, improved methods and equipment.
The answer to your heat treating production problems may well be found in a Holcroft furnace, designed individually for your own specific job. We invite your inquiries. Holcroft and Company, 6545 Epworth Blvd., Detroit 10, Michigan.
INDUSTRY LEADERS
USE Holcroft
FURNACES
BUILT BY HOLCROFT & COMPANY DETROIT · MICH
PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE
CHICAGO 9
C. H. Martin, A. A. Engelhardt
4209 South Western Blvd.
CLEVELAND 15
Wallace F. Schott
1900 Euclid Ave.
HOUSTON 1
R. E. McArdle
5724 Navigation Blvd.
CANADA
Walker Metal Products, Ltd.
Windsor, Ontario
EUROPE
S. O. F. I. M.
Paris 8, France

Exhibitors

L

Laboratory Equipment Corp., St. Joseph, Mich. Booth B247. Carbon and sulphur determination equipment; laboratory furnaces and equipment.

Lake Shore Engineering Co., Iron Mountain, Mich. Booth B134. Special industrial machinery and hoists.

Lapeer Mfg. Co., Detroit. Booth H157. Clamps and pliers.

Last Word Sales Co., Detroit. Booth H154. (See Gray-Grimes Co.)

Leeds & Northrup Co., Philadelphia. Booth F351. Temperature recorders and controllers; heat treating furnaces.

Leitz, Inc., E., New York City. Booth B211. Microscopes.

Lepel High Frequency Laboratories, Inc., New York City. Booth G145. High-frequency induction heating equipment.

Lincoln Electric Co., Cleveland. Booth F348. Arc welding equipment and supplies.

Lindberg Engineering Co., Chicago. Booth F340. Heat treating furnaces; blowers; hydraulic equipment.

Liquid Carbonic Corp., Chicago. Booth D114. Gas welding and cutting equipment.

Livingstone Engineering Co., Worcester, Mass. Booth B228. Steam-jet cleaner for floors, walls and machinery.

Loftus Engineering Corp., Pittsburgh. Booth G125. Industrial furnaces and plants.

Los Angeles Chamber of Commerce. Booth G215. (See Los Angeles Dept. of Water & Power)

Los Angeles Dept. of Water & Power, Los Angeles. Booth G215. Industrial Development of Los Angeles.

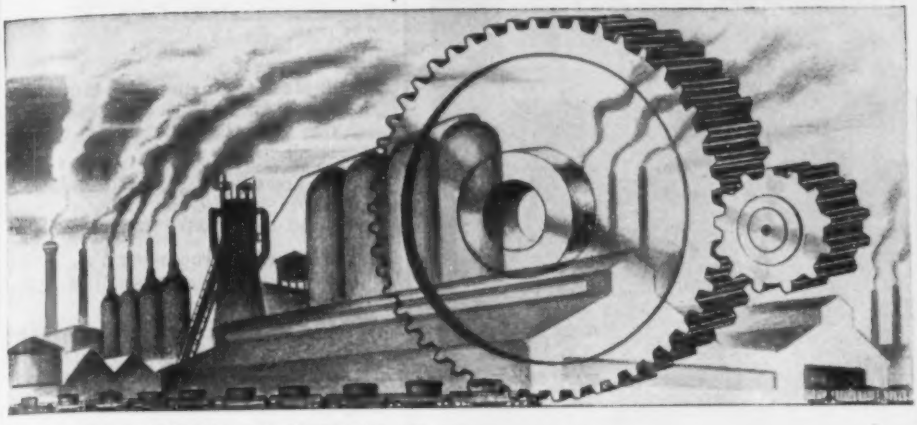
Lubriplate Division. Booth C232. (See Fiske Bros. Refining Co.)

Lynchburg Foundry Co., Lynchburg, Va. Booth D337. Cast iron pipe and fittings.

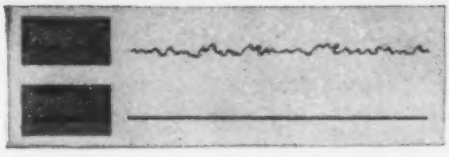
M

Machinery, New York City. Booth H128. (See Industrial Press.)

IT TOOK A LARGE STEEL PLANT to tell us how GOOD LEADOLENE *Klingfast* really is!

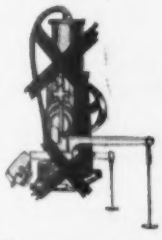


For many years it has been customary to use the Timken test machine to determine the breakdown point of lubrication. Recently a large steel plant decided that this was not a sufficient test to determine the safety point and went a step further as described in the text of this advertisement.



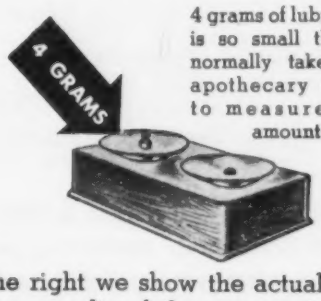
Normally the hardened and ground steel block and cup shown at the left is under constant lubrication during the Timken test and is fairly indicative of true operating conditions for bearings. However, this is not true for the lubrication of open gears. In the latter instance the applications are always of intermittent nature with the result that the application or film applied has to serve a rather long period of time before renewal is made.

This condition also exists with sleeve bearings where applications were intermittent, the bearings usually being of babbitt, bronze and cast iron.



To accomplish this condition on the Timken testing machine, the pump or flow of oil was shut off and an application of 4 grams of lubricant placed on a cup and block.

The machine was then set in operation and was watched closely until the block began to show signs of scoring as illustrated in the top line of the chart. So long as a project line appeared as is shown in the lower half of the chart, the lubricant was performing satisfactorily. In conducting this test no unusual methods were used . . . 4 grams of the lubricant under test were applied to the exterior surface of the block and cup—at room temperature. To our knowledge and to the steel company who made this original test, it is the only method that is a satisfactory answer to the lubrication of open gears in service—a lubricant that will stay on the gears and lubricate for the greatest length of time without failure.



4 grams of lubricant is so small that it normally takes an apothecary scale to measure the amount.

At the right we show the actual laboratory results of the comparative 4 gram test with competitive products.

The lubricants tested in comparison to Klingfast are all considered of quality nature and are used for open gear lubrication in general industry but particularly so in the severe service of steel plants.

Because open gears are lubricated periodically and not constantly, the pH-ilm must have lasting or enduring characteristics. Thus, the 4 gram test is truly representative of actual field operation tests for open gears. This enduring action together with extremely high pH-ilm strength guarantee the machine actual lubrication and protection.

We will gladly send you a generous sample on request.

RESULTS OF 4 GRAM *Klingfast* LEADOLENE TEST

30 MINUTES
without scoring or failing.

LUBRICANT "A"

5 MINUTES
A high grade compound scored at 5 minutes and failed in 12 minutes.

LUBRICANT "B"

8 MINUTES
A reputable lubricant of residual nature scored and failed in 8 minutes.

LUBRICANT "C"

6 MINUTES
A good lead compounded extreme pressure grease lubricant for open gears and general grease lubricant scored and failed in 6 minutes.

LUBRICANT "D"

6 MINUTES
A well-known lead compounded pressure grease lubricant for open gears and pressure lubricating systems scored and failed in 6 minutes.

*LEADOLENE—the "L P. Lubricant" (Indestructible pH-ilm) . . . for industrial needs.

The Brooks Oil Co.
Pittsburgh 12, Pennsylvania
Cleveland, Ohio
Hamilton, Ontario
Warehouses: In Principal Industrial Cities

UNITCAST PRESSES

. . REDUCE FINISHING TIME—
. . GIVE MINIMUM TOLERANCE LIMITS!

Shown above are three presses ranging from 250 to 600 ton capacities, another important part of Unitcast's facilities that add quality to the product.

- Do your castings assemble freely and within tolerance limits?
- Do your castings fit machining fixtures properly, consistently?
- Are your finish allowances held to a minimum?

INTERCHANGEABILITY has long been recognized as the forerunner of mass production. Unitcast daily production is held to the specified dimensional tolerances, assuring you this very important advantage.

UNITCAST ENGINEERS CONTINUE TO BE AT YOUR SERVICE

UNITCAST
Corporation
QUALITY STEEL CASTINGS

Give us a chance to offer a "cast steel" answer for your parts problem. Our suggestions while your product is in the design stage will pay continuous dividends. Write or call today. Unitcast Corporation, Steel Casting Division, Toledo 9, Ohio. *In Canada:* Canadian-Unitcast Steel, Ltd., Sherbrooke, Quebec.

UNITCASTINGS ARE FOUNDRY ENGINEERED

Exhibitors

Magnaflux Corp., Chicago. Booth G339 & G230. Magnetic flaw detection equipment; thickness gage; automatic punch press loader.

Magnethermic Corp., Youngstown, Ohio. Booth G234. Induction heating equipment.

Magnetic Analysis Corp., New York City. Booth B231. Magnetic inspection equipment; comparators.

Mahr Manufacturing Co., Div., Diamond Iron Works, Inc., Minneapolis. Booth B236. Heat treating furnaces.

Makepeace Co., D. E., Attleboro, Mass. Booth A301. Gold, silver and gold-filled sheet, wire and tubing.

Manufacturers Processing Co., Detroit. Booth H110. Degreasing equipment.

Martindale Electric Co., Cleveland. Booth C201. Grinding and filing equipment; saws; dust masks.

Marvin Machine Products, Inc., Detroit. Booth F416. Small milling machines.

Master Builders Co., Cleveland. Booth C131. Industrial floors and heavy equipment grouts.

McGraw-Hill Publishing Co., Inc., New York City. Booth G265. Publications—*American Machinist; Product Engineering; Welding Engineer;* books.

Mechanical Air Controls, Inc., Royal Oak, Mich. Booth H340. Air-operated and electrically operated control valves.

Mechanics Laundry Co., Detroit. Booth D303. (See Ohio Overall Cleaning Co.)

Merrill Bros., Maspeth, N. Y. Booth C134. Material handling devices.

Metal Products Sales Co., West Hartford, Conn. Booth H264. Precision investment castings; die castings.

Metal Progress. Booth H323. (See American Society for Metals.)

Metal Removal Co., Chicago. Booth H126. Die and mold finishing specialties. Tool bits and blanks, end mills, etc.

Metals & Controls Corp., Attleboro, Mass. Booth D109. Temperature control devices.

Metals Finishing Corp., Hazel Park, Mich. Booth H526. Tumbling barrel.

Metals Review. Booth H323. (See American Society for Metals.)

Michiana Products Corp., Michigan City, Ind. Booth A312. Stainless, heat resistant and abrasion resistant castings.

Michigan Industrial Gas Corp., Detroit. Booth H210. Industrial gases.

Michigan Bell Telephone Co., Detroit. Booth F401. Utilities.

Michigan Steel Casting Co., Detroit. Booth G409. Stainless steel and heat resisting alloy castings.

Turn to Page 289

Microcast Division. Booth B142. (See Austenal Laboratories, Inc.)

Miller & Taylor Tool Co., Cleveland. Booth G456. Die casting machines.

Milne & Co., A., New York City. Booth A356. Hollow die steel and graphitic toolsteels.

Mir-O-Col Alloy Co., Inc., Los Angeles. Booth A316. Hard facing alloys.

Modernair Corp., San Leandro, Calif. Booth H315. Cylinders and control valves for air power. Pneumatic and hydraulic devices.

Morton Gregory Corp. Booth G202. (See Nelson Stud Welding Division.)

Mueller Brass Co., Port Huron, Mich. Booth H241. Brass and copper products; rods, tubing, extruded shapes; bronze bearings, forgings, screw machines products.

Multifinish Manufacturing Co., Detroit. Booth H247. Magnetic devices; separating and lifting magnets.

N

National Carbon Division, Union Carbide & Carbon Co., New York. Booth F440. Carbon and graphite refractories, electrodes, pipe and fittings.

National Cored Forgings Co., Inc., South Norwalk, Conn. Booth F254. Cored nonferrous forgings.

National Cylinder Gas Co., Chicago. Booth G112. Industrial gases; welding and cutting equipment.

National Diamond Laboratory, New York City. Booth C210. Industrial diamond tools.

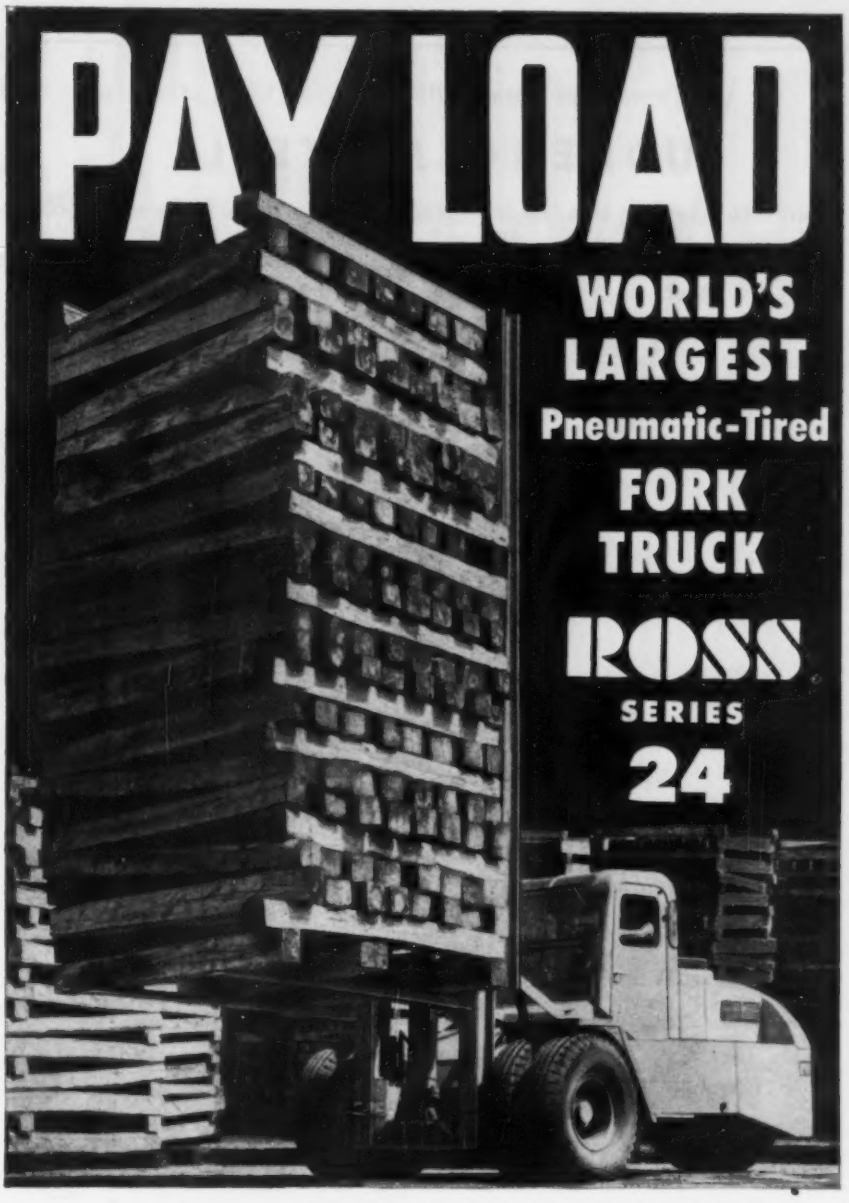
National Industrial Publishing Co., Pittsburgh. Booth C239. Copies of magazine *Industrial Heating.*

National Lead Co., New York City. Booth F449. Kirksite dies; solders and fluxes; babbitt metals.

National Radiator Co., Johnstown, Pa. Booth H109. (See Plastic Metals Division.)

National Research Corp., Cambridge, Mass. Booth A309. Vacuum-cast metals; high-vacuum furnaces and equipment.

National Spectrographic Laboratories, Cleveland. Booth B146. (See Jarrell-Ash Co.)



HANDLES LOADS WEIGHING 26,000 LBS.—72" WIDE

•

SPEEDS HANDLING OF BILLETS, BARS, IN-PROCESS AND FINISHED MATERIALS

•

HUGE 14.00-20 TIRES, PLENTY OF WEIGHT ON DRIVING WHEELS—MINIMUM YARD SURFACING REQUIRED

•

TAKES TOUGHEST OPERATING CONDITIONS IN STRIDE

•

You'll want full details on this giant fork truck . . . designed to further speed mass handling of heavy materials and reduce costs even more. Write today.

Rely On ROSS

THE ROSS CARRIER COMPANY

Direct Factory Branches and Distributors Throughout the World

425 Miller St., Benton Harbor, Michigan, U. S. A.

Three steps towards BETTER SERVICE of

UDDEHOLM STEELS

known for *Quality*, steadily improved since first made in Sweden 1668.

1 NEW YORK

Recently completed extension of our New York Warehouse enables us not only to offer a wider range of UDDEHOLM TOOL STEELS but we have also added a full range of UDDEHOLM SWEDISH STRIP STEEL in thicknesses from .001", manufactured at Uddeholm's renowned MUNKFORS mills in Sweden, including Annealed and Blue Tempered Spring Steel — Bandsaw Steel — Flapper Valve Steel — Thickness Gauge Steel — Textile Steel — Razor Steel including Stainless AEB — Reed Steel etc.

2 CLEVELAND

Uddeholm well-known TOOL STEELS, including Ground Stock and Drill Rods are again available in the Cleveland district from our newly established warehouse at 3756 Carnegie Avenue, Cleveland Phone: HEnderson 1-7440

3 LOS ANGELES

A branch office in this city with complete warehouse facilities for Tool Steel and Cold Rolled Specialties etc. now in process of construction to serve the West Coast Industries.

You are cordially invited to visit our booth B. 116 at the National Metal Exposition at Detroit October 15-19

UDDEHOLM COMPANY OF AMERICA INC.

155 East 44th Street, New York

Exhibitors

National Time & Signal Corp., Detroit. Booth B238. Timing devices and industrial process controls.

National Torch Tip Co., Pittsburgh. Booth H148. Welding supplies.

Nelson Stud Welding Division, Morton Gregory Corp., Lorain, Ohio. Booth G202. Stud welding equipment.

New Hermes Engraving Machine Corp., New York City. Booth H108. Portable machines for engraving on metal or plastics.

New Jersey Zinc Co., New York City. Booth A162. Zinc die castings and finished products.

Niagara Blower Co., New York City. Booth G422. Heat exchangers for quench oil and compressed air cooling; subfreezing systems; high-pressure heaters.

North American Philips Co., Inc. Booth A220. (See Harshaw Chemical Co.)

Nox-Rust Chemical Corp., Chicago. Booth H417. Rust-inhibited wrapper for packaging of metal parts; rust-preventive compounds.

O

Oakite Products, Inc., New York City. Booth D309. Cleaning compounds and materials.

Office Technique Pour L'Utilisation De L'Acier, Paris, France. Booth H521. French steel industry.

Ohio Crankshaft Co., Cleveland. Booth G246. High-frequency induction heating equipment.

Ohio Overall Cleaning Co., Cleveland. Booth D303. Industrial uniforms and safety equipment.

Olsen Testing Machine Co., Tinius, Willow Grove, Pa. Booth D216. Universal testing machines.

Opplem Co., Inc., New York City. Booth B138. Optical, engineering and surveying instruments.

Osborn Mfg. Co., Cleveland. Booth D118. Power and hand brushes.

Ozalid Division, General Aniline & Film Corp., Johnson City, N. Y. Booth G451. Print-making equipment; copying techniques.

P

Pangborn Corp., Hagerstown, Md Booth G421. Blast cleaning machines.

Park Chemical Co., Detroit. Booth F456. Heat treating materials.

Parker Rust Proof Co., Detroit. Booth H339. Rustproofing materials.

Peabody Industries, Highland Park, Mich. Booth H214. Hardness testers.

So! you've got A TOUGH LEVELING JOB

YOU CAN BANK ON McKAY

McKAY

always advocates a machine RUGGED enough to handle the TOP SIDE of your material specification without "*literally falling apart*". • The Inverted* or Underslung* Leveler illustrated is designed particularly to take all of the abuse required to flatten heavy plate. • This type of leveler can be either 2-Hi or 4-Hi construction. It has many advantages over conventional designs principally because springs are eliminated and all loads are transmitted to the heavy frame members. • Existing designs will accommodate work rolls from 4¼" to 15" diameter.

*Inverted levelers are patented and built exclusively by McKay

WRITE FOR MORE COMPLETE INFORMATION

The McKAY MACHINE Company
YOUNGSTOWN, OHIO

McK

ENGINEERS AND DESIGNERS OF EQUIPMENT FOR THE AUTOMOTIVE, FABRICATING AND STEEL INDUSTRIES

ASSOCIATED WITH WEAN ENGINEERING

Everybody wants a

HALLOWELL®

STEEL WORK BENCH!

WHY? Because everybody wants the *best* equipment!

The man who *works at it* wants a HALLOWELL Bench because he likes its *convenience*, its *smooth, durable work surface*, and its *rock-solid "stance"*.

The man who *buys* it wants a HALLOWELL because its *standard-unit* design simplifies plant layout, its *trim, good looks* improve shop appearance, and its *tough, steel construction* eliminates maintenance and replacement for years to come.

Whether you *use* or *buy* work benches, you'll want our Bulletin 701. It gives complete details. Write for your copy today.

SPS STANDARD PRESSED STEEL CO.
JENKINTOWN 17, PENNSYLVANIA

Exhibitors

Penton Publishing Co., Cleveland. Booth G340. Publications: *Steel; Foundry; Machine Design; New Equipment Digest;* technical books.

Peters-Dalton Inc., Detroit. Booth G355. Dust collectors; spray booths.

Phillips Manufacturing Co., Chicago. Booth A355. Vapor degreasers.

Physicists Research Co., Ann Arbor, Mich. Booth D135. Surface analysis equipment.

Picker X-Ray Corp., New York City. Booth F411. X-ray apparatus and accessories.

Platecoil Division, Kold-Hold Mfg. Co., Lansing, Mich. Booth G345. (See Kold-Hold Mfg. Co.)

Powdered Metal Products Corp. of America, Franklin Park, Ill.

Booth A118. Structural parts made by the powdered metal process.

Power Ball Oil Co., Detroit. Booth A105. Friction proof oils, compounds and materials.

Precision Metalsmiths, Inc., Cleveland. Booth B123. Precision castings.

Precision Spring Corp., Detroit. Booth A214. Steel springs.

Precision Welder & Machine Co., Cincinnati. Booth H364. Spot welding equipment.

Product Engineering. Booth G256. (See McGraw-Hill Publishing Co.)

Product Engineering & Mfg. Corp., Bridgman, Mich. Booth H221. Die castings; dies; stampings; fixtures; gages.

Production Machine Co., Greenfield, Mass. Booth F225. Polishing, buffing and deburring machines.

Pyrometer Instrument Co., Inc., Bergenfield, N. J. Booth B108. Optical, radiation, surface and immersion pyrometers.

R

RCA Victor Division. Booth D324. (See Radio Corp. of America.)

R. C. S. Tool Sales Corp., Joliet, Ill. Booth H316. Portable electric power saws.

Radio Corp. of America, Camden, N. J. Booth D324. Electronic power generators for high-frequency soldering, brazing, heat treating, electron microscopes.

YOUNGSTOWN, OHIO
ASSOCIATED WITH WEAN ENGINEERING

Exhibitors

Ransburg Electro-Coating Corp., Indianapolis, Ind. Booth G445. Electrostatic detearing and spray finishing processes.

Rapids-Standard Co. Inc., Grand Rapids, Mich. Booth H121. Materials handling equipment; conveyers.

Raytheon Manufacturing Co., Waltham, Mass. Booth A255. Welding head; power supplies; resistance welding control.

Ready-Power Co., Detroit. Booth G131. Generator sets; power units for industrial tractors and trucks; cooling units.

Reeves Pulley Co., Columbus, Ind. Booth A350. Variable speed control equipment.

Reliance Electric & Engineering Co., Cleveland. Booth A360. Electric motors, generators, speed drives.

Rem-Cru Titanium Co., Inc. Booth G310. (See Crucible Steel Co. of America.)

Reynolds Metals Co., Louisville, Ky. Booth F325. Aluminum alloys and fabricated parts.

Richard Brothers Div. Booth F302. (See Allied Products Co.)

Richards Co., J. A., Kalamazoo, Mich. Booth H152. Bending and cutting machines.

Riehle Testing Machines Division, American Machine and Metals, Inc., East Moline, Ill. Booth B246. Tensile, impact, hardness and other mechanical testing machines.

Robotron Corp., Detroit. Booth H535. Electronic control equipment.

Rockwell Mfg. Co., Milwaukee. Booth A319. (See Delta Power Tool Division.)

Rolock, Inc., Fairfield, Conn. Booth D140. Heat and corrosion resisting alloy equipment for heat treating and metal finishing.

Ross Operating Valve Co., Detroit. Booth B232. Compressed air operating valves.

Rossi, Irving. Booth G459. (See Scovill Mfg. Co.)

S

S & S Machinery Co., Brooklyn, N. Y. Booth G330. Heavy machinery.

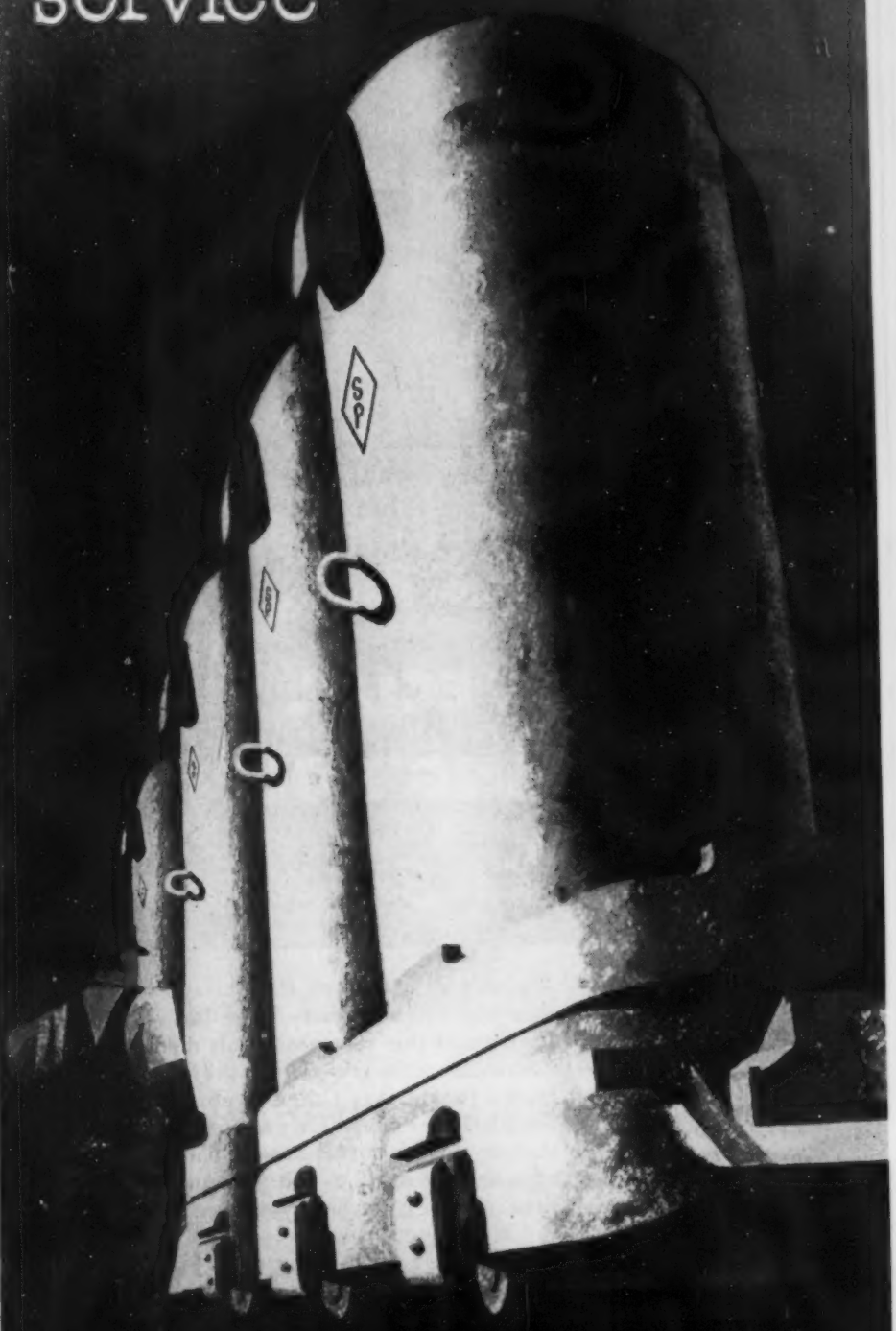
Safety Clothing & Equipment Co., Cleveland. Booth G462. Protective clothing and safety equipment.

Sales Service Machine Tool Co., St. Paul, Minn. Booth A219. Power presses; power hack saws.

Schenck, Carl. Darmstadt, Germany. Booth B218. (See R. Y. Ferner Co.)

Schrader's Son Div., A., Brooklyn. Booth G309. Pneumatic machine controls.

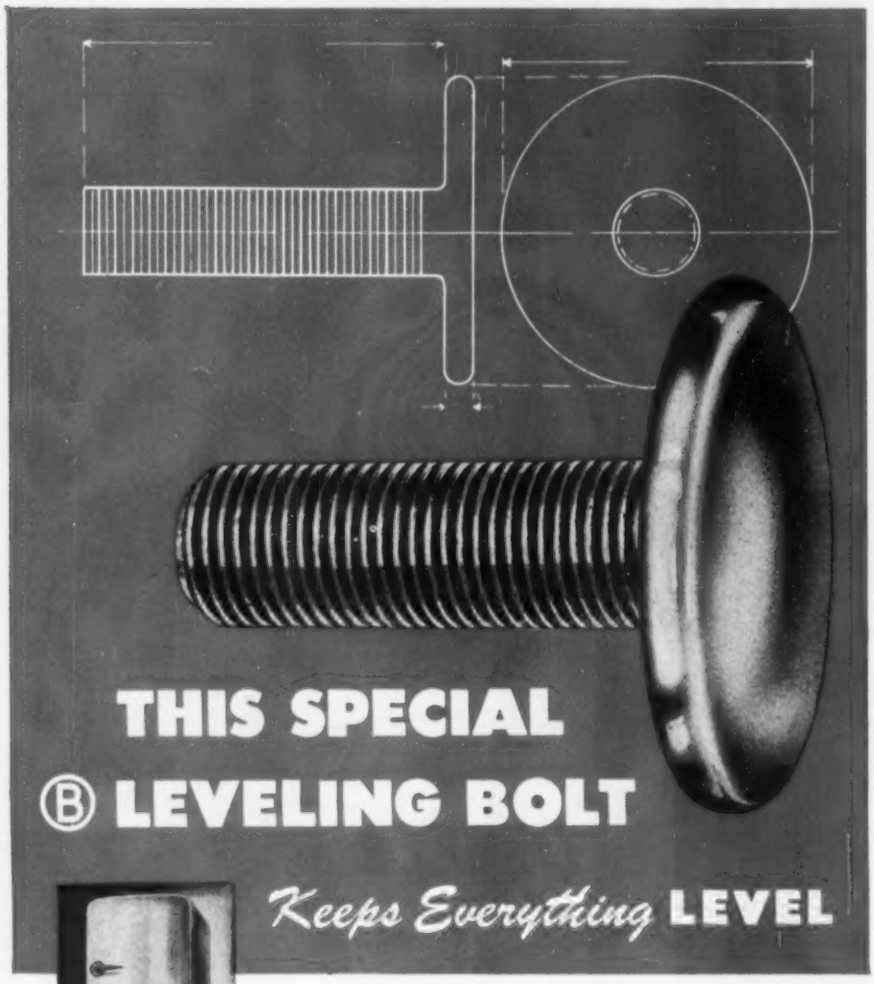
experience
skill
service



three priceless assets
behind every
SHENANGO·PENN MOLD
SHENANGO-PENN MOLD COMPANY OLIVER BUILDING PITTSBURGH, PENNA.

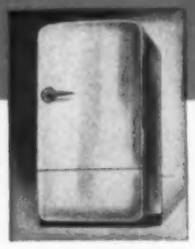
How ICE CUBES get SQUARE

Has it occurred to you that modern home appliances such as ranges and refrigerators must be provided with leveling adjustments? Floors often are not level; therefore, a special Ⓑ leveling bolt is used under each corner of your refrigerator. These bolts give the housewife level trays of liquids—they assure that the refrigerator door swings properly—and even the ice cubes are always on the square!



THIS SPECIAL Ⓑ LEVELING BOLT

Keeps Everything **LEVEL**



APPLICATIONS

For Refrigerators, Ranges, Washing Machines, Oil Burners, and similar appliances, either movable or stationary.

There's a special job to do and a special Ⓑ bolt does that job. The extremely large head plus the high strength of this rust proof bolt meet the problem. Control from the raw billet to the finished bolt is one reason for quality. Other leveling applications for these bolts are many. They can be furnished with anti-skid or smooth surfaces; with shoulder for wrench adjusting, or made to suit your particular specifications. We'll gladly help you "keep it on the level."

QUALITY...

from Blueprint to Product!

BUFFALO BOLT COMPANY

Division of Buffalo-Eclipse Corporation

NORTH TONAWANDA, NEW YORK

Sales Offices in Principal Cities. Export Sales Office: Buffalo International Corp., 50 Church Street, New York City

Our Specialty is "SOMETHING SPECIAL"

Exhibitors

Sciaky Bros., Inc., Chicago. Booth G318. Resistance welding machines.

Scott & Son, Inc., C. U., Rock Island, Ill. Booth H243. Parts made of stainless steel and heat treated.

Scovill Mfg. Co., Inc., Waterbury, Conn. Booth G459. High speed brass rod.

Seal-Peel, Inc., Van Dyke, Mich. Booth A320. Resin coatings for metals.

Selas Corp. of America, Philadelphia. Booth G148. Heating furnaces and burners.

Sentry Co., Foxboro, Mass. Booth A109. Hardening furnace; tube combustion furnace; diamond blocks and accessories.

Service Diamond Tool Co., Ferndale, Mich. Booth G117. Industrial diamonds.

Sheldon Machine Co., Inc., Chicago. Booth A155. Lathes, milling machines and shapers.

Sherman & Co. Booth D129. (See American Silver Co., Inc.)

Sinclair Refining Co., Chicago. Booth H358. Industrial lubricants; cutting oils, drawing compounds, industrial greases.

Smith Corp., A. O., Los Angeles. Booth H524.

Smith Welding Equipment Corp., Minneapolis. Booth A208. Welding torches, accessories and special purpose tips.

Socony-Vacuum Oil Co., Inc., New York City. Booth G221. Cutting and grinding oils; lubricants; rust preventives.

Solventol Chemical Products, Inc., Detroit. Booth A202. Cleaning compounds.

Sonoflux Corp., Houston, Texas. Booth H146. Magnetic particle inspection equipment.

Sparkler Mfg. Co., Mundelein, Ill. Booth A218. Industrial filters.

Special Libraries Association, Metals Section, New York City. Booth H424. Both American and foreign books and periodicals for the metallurgist. Library and reference service. Translations index.

Spencer Scientific Instruments. Booth B128. (See American Optical Co.)

Spencer Turbine Co., Hartford, Conn. Booth G260. Vacuum cleaning equipment; turbo compressors.

Sperry Corp. Booths G109 and D115. (See Vickers, Inc., and Sperry Products, Inc.)

Sperry Products, Inc., Danbury, Conn. Booth D115. Ultrasonic instruments for detection of flaws and measuring thickness.

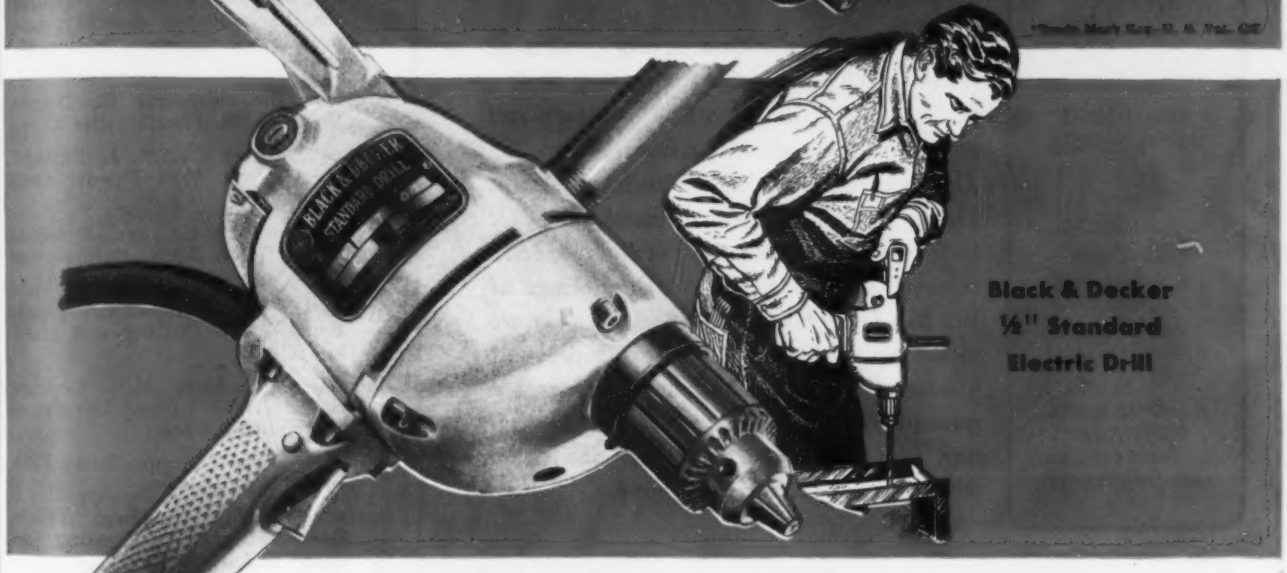
Standard Alloy Co., Cleveland. Booth D140. Heat resisting furnace parts.

Drilling Problem?

Black & Decker's Drill Line is a good bet to solve it!

Black & Decker ¼" HOLGUN* Electric Drill

*Trade Mark Reg. U. S. Pat. Off.



Black & Decker ½" Standard Electric Drill

Completeness of Line, Quality Construction Pay Off for Users!

FOR drills to fit your needs—for top performance on any portable drilling job—it pays to check Black & Decker *first!* That's because Black & Decker gives you an unmatched choice of Drill models. Capacities from ¼" to 1¼"—choice of handle arrangement for easiest operation—choice of speed, power and price in most capacities. And it's also because Black & Decker Drills give you powerful B&D-built motors—full ball-bearing construction—extra-tough gears, shafts and chuck spindles—husky housings, streamlined design, perfect balance.

Whether your problem is in production, maintenance or construction—whether it requires large or small drills—see your nearby B&D Distributor *first* for expert help. And write today for free, detailed catalog to: THE BLACK & DECKER MFG. CO., 651 Pennsylvania Ave., Towson 4, Maryland.

LEADING DISTRIBUTORS EVERYWHERE SELL

B&D Black & Decker PORTABLE ELECTRIC TOOLS

WORLD'S LARGEST, MOST COMPLETE LINE

Electro HIGH SPEED

48 POUNDS FASTER

Electro SINCE 1919

HIGH SPEED WHEELS FOR SNAGGING CUTTING-OFF TOOL ROOM AND CYLINDRICAL GRINDING for Swing Frame, Floor Stand, Bench Stand and Portable Grinding Machines

GRINDING WHEEL MANUAL 645 and Speed Calculator FREE ON REQUEST

Figure it as a 45% time saving or as a 48 pound production gain. Either way, it is a new high in grinding wheel efficiency and economy. ● On grinding from 24" to 20" diameter on annealed malleable castings, Electro removed 6.8 lbs. of metal per cubic inch of wheel at 10.4 lbs. per hour. Electro removed 153 lbs. as against the average of 105 lbs. for competitive wheels. ● May we show you with this or any other types of Electro wheels that comparable gains are immediately possible for you? A demonstration will place you under no obligation whatever. Write, wire or phone.

Electro Refractories & Abrasives Corporation

344 DELAWARE AVE.
BUFFALO 2, N. Y.

WEST COAST WAREHOUSE, LOS ANGELES 58, CALIFORNIA
ELECTRIC FURNACE PLANT, CAP-DE-LA-MADELEINE, P. Q., CANADA

Electro

Exhibitors

Standard American Engineering Co., Lyons, Ill. Booth D110. Combined radiation and convection heat treating furnace.

Standard Diemaker Supplies, Detroit. Booth H328. Diemaker supplies.

Standard Electrical Tool Co., Cincinnati. Booth G210. Grinding, buffing and polishing equipment.

Standard Oil Co. of Indiana, Chicago. Booth D130. Cutting oils; quenching oils; lubricants.

Standard Steel Treating Co., Detroit. Booth H139. Commercial heat treating.

Standard Tube Co., Detroit. Booth A216. Electric welded steel and stainless steel tubing; upset tubes and forgings; fabricated tubular parts.

Starrett Co., L. S., Athol, Mass. Booth C123. Mechanic's hand measuring tools and precision instruments; hacksaws and band saws.

Steel. Booth G340. (See Penton Publishing Co.)

Steel City Testing Machines, Inc., Detroit. Booth G220. Universal tensile, hardness, ductility, compression, and special testing machines.

Stevens, Inc., Frederic B., Detroit. Booth D330. (See Udylite Corp.)

Stokes Machine Co., F. J., Philadelphia. Booth A158. Powder metal presses.

Stone Machinery Co., Inc., Syracuse, N. Y. Booth A359. Metal cut-off machines.

Stuart Oil Co., Ltd., D. A., Chicago. Booth A266. Cutting and grinding oils.

Sub Zero Products Mfg. Division. Booth H254. (See Deepfreeze Distributing Corp.)

Sunbeam Corp., Chicago. Booth F256. Industrial furnaces.

Surface Combustion Corp., Toledo. Booth F240. Heat treating furnaces and equipment.

Syntron Co., Homer City, Pa. Booth H135. Portable electric tools.

T

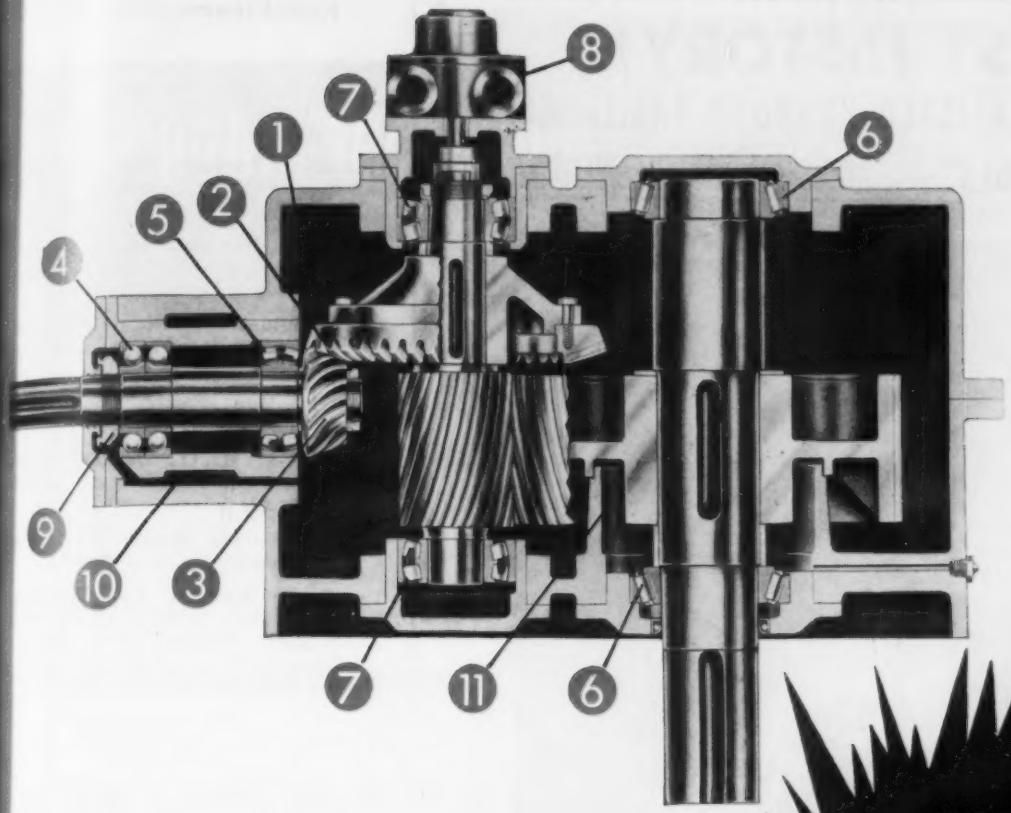
Tagliabue Instruments Div. Booth B227. (See Weston Electrical Instrument Corp.)

Tempil Corp., New York City. Booth C117. Temperature - indicating crayons, pellets and paint.

Tennant Co., G. H., Minneapolis. Booth H530. Floor cleaning and maintenance machines.

Texas Co., New York City. Booth C103. Cutting coolants and lubricants.

Tin Research Institute, Inc., Columbus, Ohio. Booth B236. Information on production, consumption, properties and applications of tin.



PUT US "ON THE SPOT"

Send For This "Text Book"

. . . make us tell you the "11 points" of superiority of PHILADELPHIA SPIRAL-BEVEL REDUCERS

These Units offer a dependable means of transmitting power at right angles (either horizontally or vertically). They're available in single, double and triple reductions . . . ratios ranging from 1.5 to 1 up to 238 to 1. Hundreds are in daily use throughout Industry.
Send for Catalog SB-50 and kindly use your Business Letterhead when requesting it.

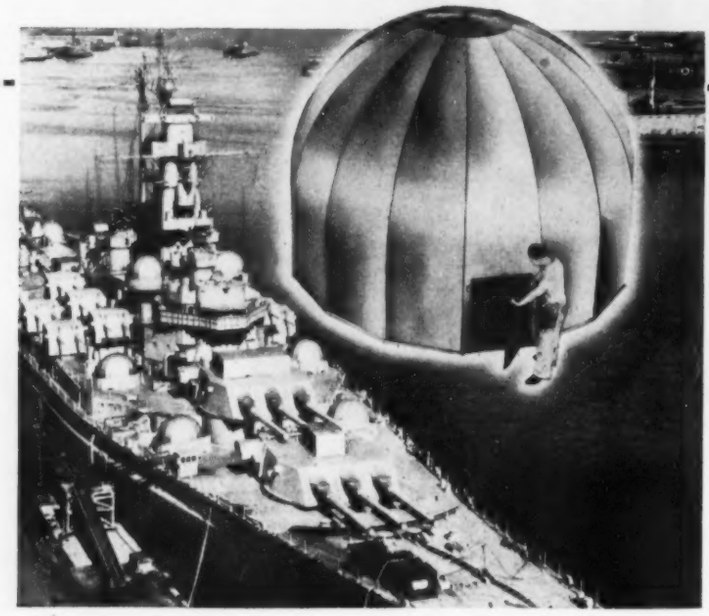
Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.
IN CANADA: WILLIAM AND J. G. GREEY LIMITED, TORONTO

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

PAST HISTORY!

THE NAVY ENLISTED BRANDT'S FACILITIES FOR "MOTHBALLS" . . . AND BRANDT DELIVERED!



NOW THE NAVY'S BACK AT BRANDT'S WITH HIGH-PRIORITY DEFENSE WORK*

As reported in September Reader's Digest, The Fleet's In—in good shape, thanks to the Navy's foresight. Brandt was a prime contractor in "Operation Mothball", the security investment that paid off. Now the Navy is back at Brandt's with new top-secret projects . . . and Brandt will deliver!

Brandt's assembly lines are geared for mass production of prime and sub-contract defense work. Proximity to steel mills and rail and water transportation assures on-time delivery.

** Regardless of stepped-up defense production, our industrial accounts still receive prime consideration.*

Write on your company letterhead for handy file listing our production facilities.

METAL STAMPINGS
HEAVY WELDMENTS
PRESSED STEEL SHAPES

CHARLES T. BRANDT, INC.
1700 Ridgely St.
BALTIMORE 30, MD.

BRANDT
BALTIMORE

Exhibitors

Tincher Products Co., Sycamore, Ill. Booth C228. Process for recovery of porous castings; products for repairing cracked engine blocks.

Tinnerman Products, Inc., Cleveland. Booth C207. Fasteners—Speednuts, Speedclips and Speedclamps.

Tocco Induction Heating Equip. Div. Booth G246. (See Ohio Crankshaft Co.)

Tool Engineer. Booth H245. (See American Society of Tool Engineers.)

Tracerlab, Inc., Boston. Booth B118. Radioactive instruments.

Trerice Co., H. O., Detroit. Booth B245. Thermometers; steam traps; air filters.

Trent Tube Co. Booth G310. (See Crucible Steel Co. of America.)

Tri-Clover Machine Co., Kenosha, Wis. Booth H346. Stainless steel fittings; pumps, valves and filters; stainless steel tubing; super-speed tools.

U

Uddeholm Company of America, Inc., New York City. Booth B116. Swedish steels; toolsteels.

Udylite Corp., Detroit. Booth D330. Plating and polishing equipment.

Union Carbide and Carbon Corp., New York City. Booth C440. (See Haynes Stellite Division, Linde Air Products Co., and National Carbon Division.)

United Chromium, Inc., New York City. Booth B132. Metal finishing and electroplating processes and materials.

U. S. Air Forces, Wright-Patterson Air Force Base, Dayton, Ohio. Booth H136. Materials research.

U. S. Electrical Motors, Inc., Los Angeles. Booth D302. Electrical motors and power drives.

U. S. Gypsum Co., Chicago. Booth H143. Construction materials.

Universal Castings Corp., Chicago. Booth G115. Plaster mold nonferrous castings.

Universal-Cyclops Steel Corp., Bridgeville, Pa. Booth F247. Toolsteels; stainless and special steels.

Univertical Machine Co., Detroit. Booth H348. Hammers, plating anodes, non-ferrous precision castings.

Upton Electric Furnace Co., Detroit. Booth C102. Furnaces and salt baths.

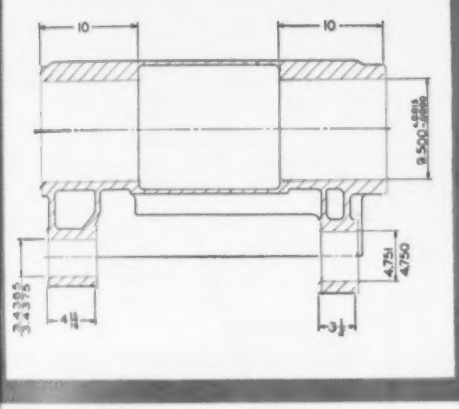
V

Vanadium-Alloys Steel Co., Latrobe, Pa. Booth D345. Toolsteels.

Vapofier Corp., Chicago. Booth C109. Gas generators.

the jigmil technique *solves the problem*

of small lot production at The Oster Mfg. Company Cleveland, Ohio



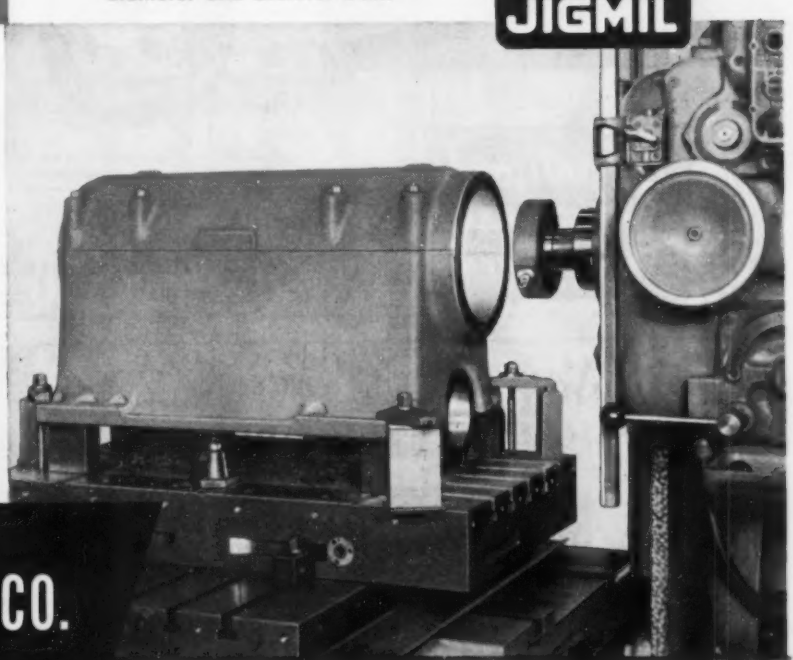
MACHINE—Model 3-B JIGMIL
PART—Spindle Head—Pipe Threading Machine
MATERIAL—Cast Iron

Sequence of Operations—With part mounted on standard JIGMIL Index Table,

1. Rough bore 9.500" diameter and face boss.
2. Finish bore 9.500" diameter and chamfer boss.
3. Rough and finish bore 4.750" diameter.
4. Index 180°.
5. Rough and finish bore 3.438" diameter.
6. Rough bore 9.500" diameter and face boss.
7. Finish bore 9.500" diameter and chamfer boss.

"IN LINE" bores are machined to Precise Limits of Alignment by means of the JIGMIL INDEXING PRINCIPLE.

- **All machining operations performed at one set up of workpiece.**
- **No Costly Line Boring Bars.**
- **No Boring Jigs.**
- ***Fast Production and High Accuracy.***
- ***Substantial Reduction in Assembly Costs.***



DEVLIEG MACHINE CO.

450 FAIR AVE., DETROIT 20, MICHIGAN

What's the rush?

Better Steel Strapping Service!

JACK PETERS of Atlanta—like other Brainard Strapping System representatives—is always on the move.

That's because Jack knows the ins and outs that improve packaging and shipping methods. For instance, Brainard's catalog lists over a thousand different items of steel strapping, each designed to do a particular job better.

Which one do *you* use for *your* problem? That's where Jack Peters and his fellow Brainard field men come in. With their training and experience, they know the answers. Try them and see.

Brainard representatives are located throughout the U. S.; in Canada, P. J. McArthur Company in Toronto.

COMPLETE STRAPPING SERVICE. LIGHT AND HEAVY DUTY STRAPPING, TOOLS AND ACCESSORIES

Brainard

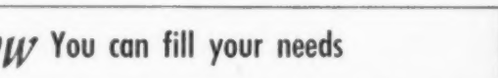
SHARONSTEEL

WRITE: STEEL COMPANY STEEL STRAPPING DIVISION, WARREN, OHIO

LOCK JOINT

Specialty

Now You can fill your needs with HELICAL welded or lock-joint tubing



As Welded

- Stainless tubing
- Cold drawn tubing
- Welded tubing
- Special purpose tubing
- In all available materials

For full detailed information about Helical Tubing send today for your HETCO Catalog.

HELICAL TUBE CORPORATION

19 Washington St., East Orange, N. J.

Manufacturing Plant—Grand Rapids, Michigan

Exhibitors

Vickers, Inc., Detroit. Booth G10 Hydraulic pumps, valves, contro and fluid meters.

Victor-Peninsular Div. Booth F10 (See Allied Products Co.)

Vlier Mfg. Co., Los Angeles. Boot B204. Torque thumb screw spring plungers; spring stop fixture keys.

W

Walder-Scott, Inc., Detroit. Boot G101.

Walker-Turner Division, Kearney Trecker Corp., Plainfield, N. J Booth A240. Drill presses, meta cutting saws.

Wall Colmonoy Corp., Detroit. Boot B243. Hard facing alloys.

Warner Division. Booth H546. (Se Clinton Machine Co.)

Webber Appliance Co., Inc., Indianapolis, Ind. Booth H248. Furnaces.

Weldit, Inc., Detroit. Booth H54 Welding and cutting apparatus.

Wells & Sons, W. F., Three Rivers, Mich. Booth H117. Metal cutting machinery.

Wells Manufacturing Corp., Three Rivers, Mich. Booth D209. Metal cutting bandsaw machines.

Weltronic Co., Detroit. Booth G22 Electronic control equipment.

Western Sealant of Detroit, Inc., Detroit. Booth C118. Sealants for castings.

Westinghouse Electric Corp., Pittsburgh. Booth G430. Welding machines; high-frequency equipment; magnetic materials; pure metals.

Weston Electrical Instrument Corp., Newark, N. J. Booth B227. Electrical measuring instruments and appliances.

Wheelco Instruments Co., Chicago. Booth D219. Temperature measurement, recording and control instruments.

Wilson Carbon Co., New York City. Booth B220. Industrial carbon products.

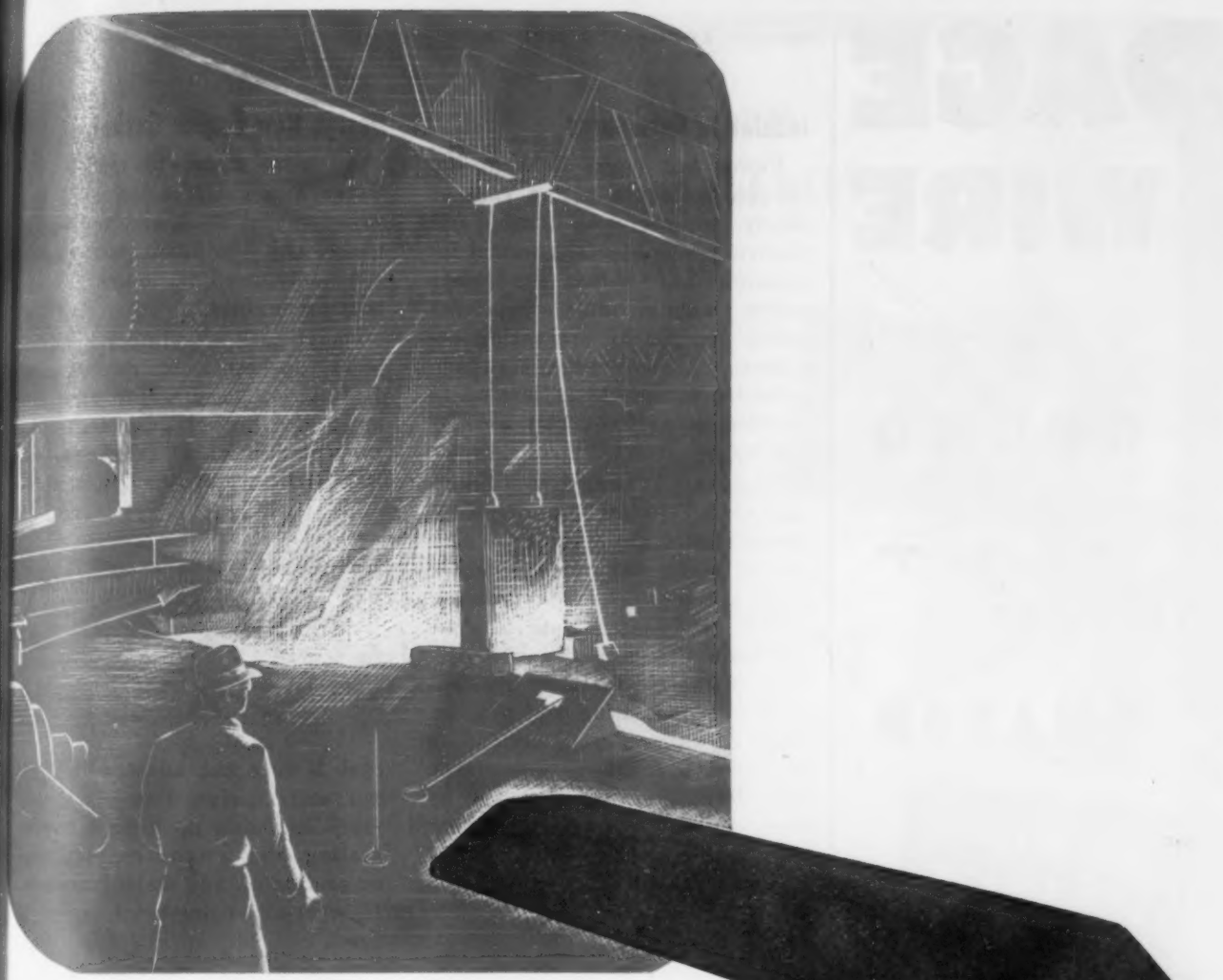
Wilson Mechanical Instrument Co., New York City. Booth A342. Tukon and Rockwell hardness testers.

World Raw Materials Congress. (See Congrés International des Fabrications Mécaniques.)

Worthington Pump & Machinery Corp., Harrison, N. J. Booth G455. Welding and assembly positioning equipment.

Wynne Oil Co., Milford, Mich. Booth H124. Ring, valve, bearing and gear oils.

Zeiss, Inc., Carl. Booth B243. (See Ercona Corp.)



MERITE

PIG IRON

Highest Quality

MORE USED THAN ANY OTHER MERCHANT PIG IRON

P M

PICKANDS MATHER & COMPANY

UNION COMMERCE BUILDING • CLEVELAND 14, OHIO

CHICAGO • CINCINNATI • DETROIT • DULUTH • ERIE • GRAND RAPIDS • TOLEDO
GREENSBORO • INDIANAPOLIS • MINNEAPOLIS • ST. LOUIS • WASHINGTON

IRON ORE • PIG IRON • COAL • COKE

SIXTY-EIGHT YEARS OF SERVICE TO INDUSTRY

PAGE WIRE

ROUND
FLAT
OR
SHAPED

LOW CARBON
HIGH CARBON
STAINLESS
SPECIAL ALLOY
ARMCO IRON

You draw the Shape —Page can draw the Wire

—the way you want it for your production—whether it's ALL of your product, or only a part.
Cross-sectional areas up to .250" square; widths to ⅜"; width-to-thickness ratio not exceeding 6 to 1.

for Wire or Information about Wire—

Get in touch with Page!

ACCO

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

Insulation Cuts Burns

Fewer lost hours through on-the-job accidents is the goal of safety engineers in steam and electric power plants. Thermal insulation has helped up-to-date power plants maintain exceptional safety records by preventing accidental burns where high-temperature equipment is located in working areas frequently used by employees.

Engineers at Long Island Lighting Co.'s 170,000 kw Glenwood power station anticipated the danger of accidental burns where a vertical pipe line containing 350°F ash passed near a stair handrail. The 8-in. line was covered with 1½-in.-thick molded-type pipe insulation and a ½-in. layer of mineral wool cement up to about 6 ft above floor level. The insulation was finished by covering the mineral wool cement with a single layer of asphalt paper and 10-oz canvas which was glue-sized and painted.

Low-H Electrode Stabilizer

A new moisture content stabilizer has been developed to protect low-hydrogen welding electrodes from atmospheric moisture.

The shielding of low hydrogen electrodes is "thirsty." If exposed to normal shop atmosphere for only a short time, it absorbs sufficient moisture to destroy the low hydrogen quality.

With increased use of the "low hydrogen" welding process, it has become necessary to find some means of protecting the electrodes from atmospheric moisture after they are removed from the moisture-proof container.

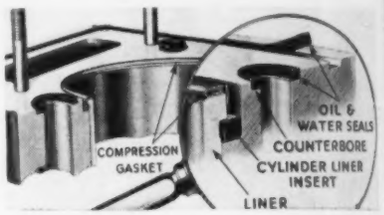
A compact, efficient, moisture-content stabilizer has been introduced which provides desired protection of low hydrogen welding rods at point of use.

The unit, which stores up to 400 lb of electrodes, is made by Fred C. Archer, Inc., Milwaukee.

Design New Engine Gasket

A new metal-to-metal oil, water and compression seal between engine block and head does away with the laminated gasket commonly used in internal combustion engines.

Tough task of cylinder head-to-block gasketing is compression sealing. Oil and water passages must also be perfectly sealed to prevent dilution of crankcase oil. Detroit Diesel Engine Div. of General Motors has adopted individual seals designed to place primary emphasis upon compression sealing and secondary emphasis on sealing oil and water passages. No over-all or one-piece gasket is used.



Compression gaskets, in the form of laminated terne plate rings, take the major pressure of the head-to-block stud bolts.

When the head is pulled down a positive metal-to-metal contact is assured between the head, compression gaskets and cylinder liners. Adjacent to the compression gaskets are clearances between the head and block of from .007 to .014 in. This assures positive contact on the compression gaskets and positive compression sealing.

Water and oil passages between head and block are sealed with individual synthetic rubber seals. These fit into grooves machined in the block and are compressed when the head is bolted on, forming an effective sealing device.

Welding Saves 3000 Man-Hours

The Otis Elevator Co. Ltd., Hamilton, Ontario, has saved an estimated 3000 man-hr per year by the adoption of mechanized

NOW—COMPLETELY UNIFORM INDUCTION HEATING WITH BALANCED ELECTRICAL LOADING

There is absolutely NO Comparison!

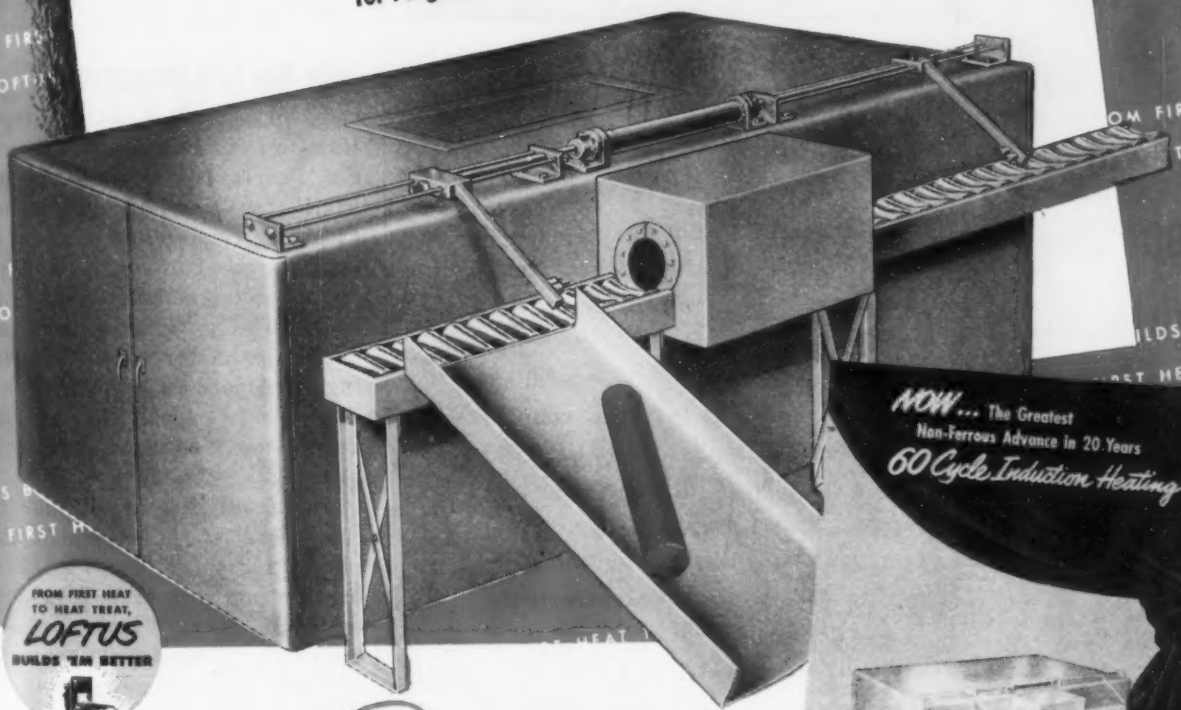
by Loftus

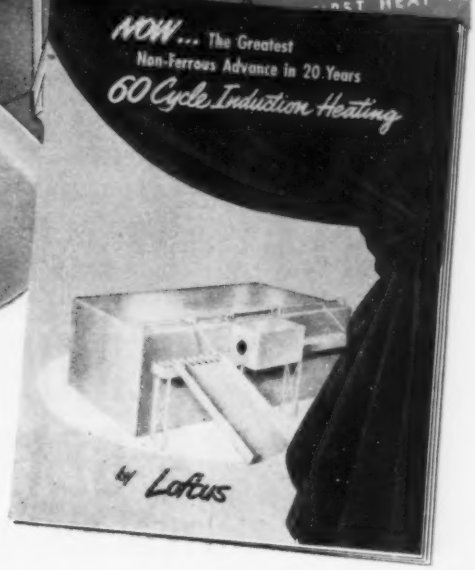
You can now profit from efficient induction heating that assures electrical balance on your power line. PLUS the amazing new "INTERTWIN" Coil that guarantees *uniform, efficient* heating of the billet.

The new Loftus Induction Furnace can't be equalled for clean, economical, efficient operation. Write for descriptive booklet today.

for Heating Aluminum, Brass, Copper, Magnesium and some applications of Steel

for Forging — Extrusion — Rolling





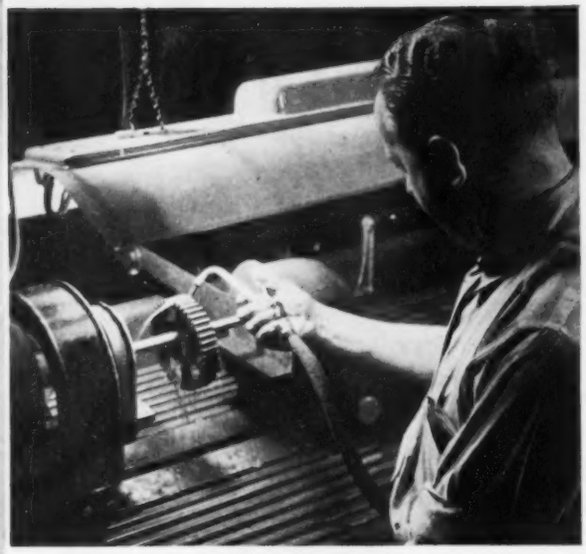
FROM FIRST HEAT TO HEAT TREAT, LOFTUS BUILDS 'EM BETTER

LOFTUS ENGINEERING *corporation*

610 SMITHFIELD ST. PITTSBURGH, PA.

Designers and Builders of Industrial Furnaces

PERKINS custom-made GEARS provide + performance



MAGNAFLUX INSPECTION: Accuracy and variety of devices used in our inspection department are of prime importance in maintaining PERKINS' quality standards.

Write for our bulletin "Perkins Gears" for full data on our gear engineering facilities

Perkins custom-made Gears—for aircraft engines or for any other application—are first and foremost the product of a reliable and experienced gear engineering organization. Thus they provide a consistent plus in the performance of the product in which they are installed.

Our equipment and facilities coupled with the individual skills of New England craftsmen enable us to fill orders for any type of gear in any quantity, any size and any material—metallic or non-metallic.

Have us quote on your requirements.

PERKINS MAKES:
Helical Gears
Bevel Gears
Ratchets
Worm Gears
Spiral Gears
Spur Gears with shaved or ground teeth
Ground Thread Worms

PERKINS MACHINE & GEAR COMPANY

WEST SPRINGFIELD, MASSACHUSETTS

Heliarc welding on the edges of steel elevator doors.

The doors are located in an air-operated fixture that eliminates manual handling. The welding machine proper consists of a Heliarc torch mounted on an Oxweld machine carriage which travels on a 2-rail track.

Welds are made with a ⅛-in. tungsten electrode traveling at a speed of approximately 25 ipm, using a current of 135 to 140 amp. A high frequency unit is used for starting the arc, therefore, the electrode can be kept the same distance from the work during the whole operation. The operation can be observed at all times through a visual panel located in the box that shields the welding zone.

By using this process, permitting the elimination of manual welding and grinding on hollow metal doors, Otis has improved the quality of the doors and appreciably cut the manufacturing time.

Tote Box Life Increased

To increase the usable lives of its tote boxes, Caterpillar Tractor Co., Peoria, Ill., has begun a program for reconditioning them. Cleaning, rinsing and painting operations are carried on. Chipped paint and accumulated rust are removed in an airless blast cabinet designed for continual cleaning by American Wheelabrator & Equipment Corp., Mishawaka, Ind. Each box requires 2 min of blasting.

The front of this cabinet has two doors, either of which completely closes the cabinet. A 66-in. rotating work table is mounted on each door. Closing a door moves the loaded table into the blasting zone. An operator can maintain a continual cleaning schedule, because while one tote box is under the blast he can load the other table and have it ready for blasting when the first one comes out.

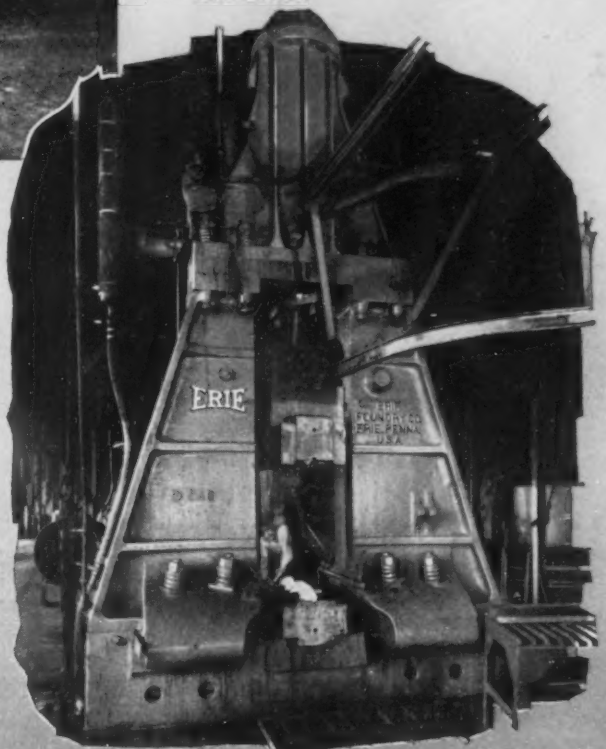
Caterpillar has placed a fixture on each table for holding the

21 ERIE

STEAM HAMMERS HERE!

A large mid-western forge shop is making quality automotive forgings on 2 Erie Steam Hammers of 12,000 lb. rating, 10 Eries of 5,000 lb. rating and 9 Eries of 15,000 lb. rating. Why? Mainly because Erie Hammers are the choice of experienced Hammergangs and of the management men who pay the bills. Rugged Dependability is the answer—Erie Hammers produce profitably!

On Erie Hammers all stressed parts, frame, anvil, upper works are steel.



9 - 15,000 lb.

2 - 12,000 lb.

10 - 5,000 lb.

ERIE

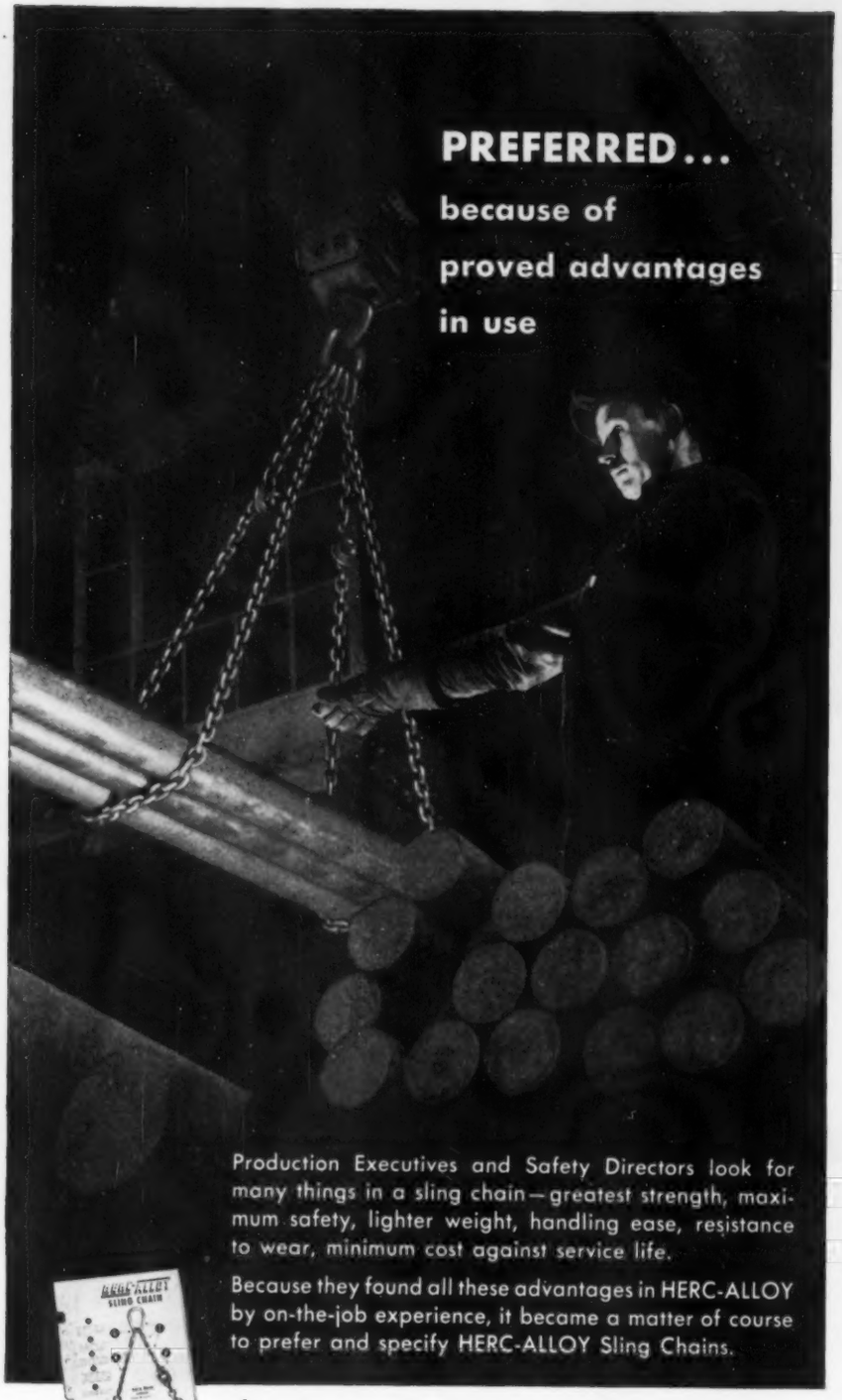
Write for Bulletins Describing in Detail Erie Steam Drop, Board Drop, Single and Double Frame Forging Hammers, Pneumatic Hammers and Trimming Presses.

ERIE FOUNDRY COMPANY

Erie, Pa., U.S.A.

ERIE BUILDS *Dependable* HAMMERS

HERC-ALLOY
SLING CHAINS



Production Executives and Safety Directors look for many things in a sling chain—greatest strength, maximum safety, lighter weight, handling ease, resistance to wear, minimum cost against service life.

Because they found all these advantages in HERC-ALLOY by on-the-job experience, it became a matter of course to prefer and specify HERC-ALLOY Sling Chains.

Write for illustrated Data Book No. 3 which contains helpful information on sling chain selection and use.

COLUMBUS McKINNON CHAIN CORPORATION
(Affiliated with Chisholm-Moore Hoist Corp.)
GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.
District Offices: New York • Chicago • Cleveland
Other Factories at Angola, N. Y., Dixon, Ill., St. Catharines, Ont., Can., and Johannesburg, South Africa.

boxes, so that all surfaces are completely covered by the abrasive thrown from two rotating wheels. Each box is blasted in two positions, with 1 min required in each position. Approximately 187,000 tote boxes will be put through the reconditioning program. Each box will go through reconditioning every 2½ years and it is expected that service life will be doubled.

Damage in Transit:

New device records impacts on cargoes, tells when bumps occur.

The Air Force's Air Materiel Command wants to find out where and when its shipments are damaged in transit so that it can be avoided the next time. They also think they may have the answer: An impact recorder, concealed inside a package or mounted in a freight car or truck. This device notes when a shock or impact occurs, the intensity of that impact, and from what direction the jolt came.

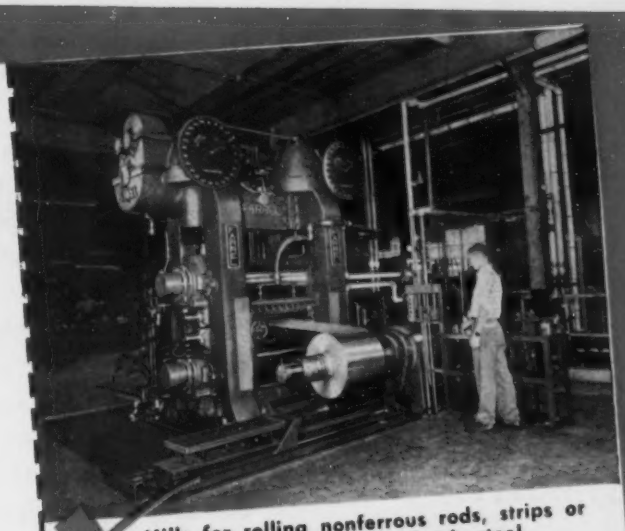
By scanning the recorder's wax-coated tape after delivery, the packaging engineer can read a description of what happened, impact-wise, along the package's route.

The Air Force recently bought 15 of these impact recording instruments. Some will go to the Military Air Transport Service. These will be installed in cargo planes and packages to find where the bumps come from in aerial transit and what can be done to iron out the ride.

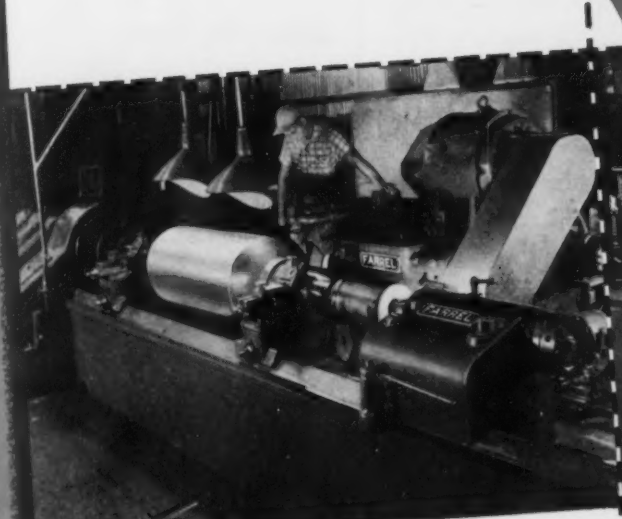
The remainder will undergo controlled laboratory experiments at the Wright Air Development Center. There packaging people will determine limitations of the recorder, if any, and decide when and where the instruments may be used in the field. The recorders are made by Impact-O-Graph Corp., Cleveland.

Impact-O-Graph works this way: A dry cell battery actuates a motor which turns a roller carrying

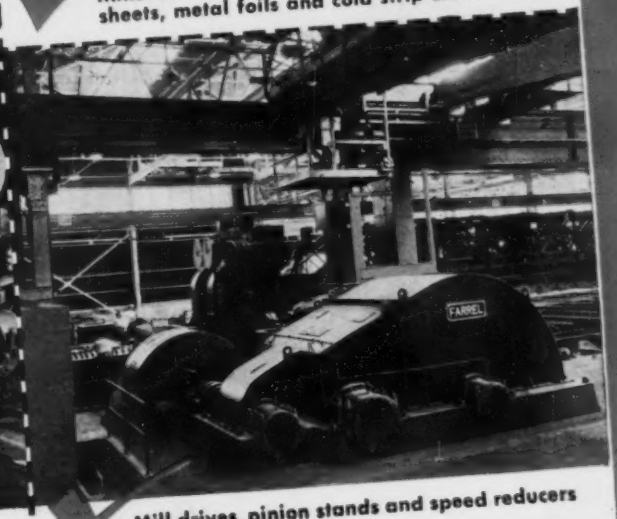
Check your requirements WITH FARREL



Mills for rolling nonferrous rods, strips or sheets, metal foils and cold strip steel.



Roll grinders for grinding rolls up to 60" in diameter, in any length required.



Mill drives, pinion stands and speed reducers for auxiliary drives.

For close to a century, Farrel has specialized in designing rolling mill equipment for the solution of specific production problems.

Mills are built in a wide range of types and sizes for rolling nonferrous rods, strips or sheets, metal foils and cold strip steel. The company also designs and manufactures the reduction gear drives and pinion stands, coilers and special handling equipment required to make each installation a complete production unit.

Speed reducers for auxiliary drives are available in a wide range of ratios and capacities. Designs include single, double and multiple reduction units; speed-change units; right-angle drives and drives to meet special requirements.

Another problem solver is the Farrel roll grinder. Available in two types and nine standard sizes, these machines enable you to fix and maintain definite standards of accuracy and finish. Rolls are produced with a perfect surface, free from marks of any kind, ground straight, or with concave or convex contours of exact symmetry and accuracy.

Information and engineering consultation regarding any of the products mentioned on this page are available, without obligation.

FARREL-BIRMINGHAM COMPANY, INC. • ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Pittsburgh, Chicago, Los Angeles, Houston

Farrel-Birmingham®

FB-700

CORROSION

stopped *before* it starts

with Lebanon CORROSION-RESISTANT CASTINGS...

Stopping that metal-eating "glutton"—corrosion, before he even gets started, is something we've had a hand in doing for many years.

Stainless castings produced by Lebanon's exclusive processes have the *right* composition, the *right* uniformity and the *right* internal integrity to keep corrosion from taking its toll. Our twenty years of experience in developing and producing castings that are resistant to many corrosive agents, mean that we can accurately anticipate your needs.

If your problem is corrosion, bring that problem to our engineers... they'll help you defeat this enemy before he has a chance to start. Lebanon REFERENCE CHARTS give complete information on the types of material available... write for your copies today.

LEBANON STEEL FOUNDRY
Lebanon, Pennsylvania
"In the Lebanon Valley"

Valve Bodies and Fittings are typical of the types of castings made by Lebanon to be used in services where corrosion is a factor.

LEBANON ALLOY AND STEEL Castings

CIRCLE L

a wax-coated tape at a known speed. On the tape ride three styli, which, when actuated by shock or impact, indicate the intensity of such action and the time of impact. The arms work independently of one another, recording in three directions.

The recorder will even indicate a change in position of the package — particularly valuable with "This End Up" containers. Its motor will operate continuously for 28 days.

Reinforcing Bars:

Building code is sharply revised by results of AISI research work.

Improved design and better bond strength of concrete reinforcing bars have come from research at the National Bureau of Standards under a research fellowship of the American Iron and Steel Institute. In addition, the American Concrete Institute has modified its building code requirements for allowable bond stresses in reinforced concrete. Finally, a new standard specification has been adopted by the American Society for Testing Materials. This specification is the first nationally recognized standard describing the physical characteristics required in a reinforcing bar to produce a good bond between concrete and steel.

The sufficiency of plain bars was questioned when it was found that they offered little resistance to slipping. Various approaches, such as anchoring at the ends by "hooking," were tried. This was not the best solution, and bars with ridges, ribs, and other projections (called deformations) which would transfer stress from one material to the other along the length of the bar were designed. The projections are rolled into the surface of the bars in the finishing pass through the rolling mill.

The first phase of the research program was a comparison of bond strength of the 17 shapes and patterns of reinforcing bars

"Impressions that LAST"

FINKL MO-LYB-DIE Processed Die Blocks are made from steel developed by Finkl to answer the needs arising from drop forging problems. Their inherent toughness, resistance to heat checking and washing, high resistance to abrasion, and good machinability are the combinations that give you more forgings per impression and more impressions per die.

The MO-LYB-DIE trademark on a die block is a guarantee that the utmost care and attention have been given to forging, heat treating and testing operations. Learn for yourself—specify Finkl die blocks and get impressions that last.

A. Finkl & Sons Co.

2011 SOUTHPORT AVENUE • CHICAGO 14

Eastern Warehouse
INDUSTRIAL STEEL, INC.
250 Bent Street, Cambridge 41, Mass.

Western Warehouse
FINKL STEEL PRODS. OF CALIF.
4908 Santa Monica Blvd., Los Angeles 27, Calif.

Detroit, Michigan ★ Cleveland, Ohio ★ Pittsburgh, Penna. ★ Louisville, Ky. ★ St. Paul, Minn. ★ Houston, Texas ★ Birmingham, Ala. ★ San Francisco, Calif.

"REJECTS CAN BE MINIMIZED WITH THE RIGHT CUTTING FLUID"

THERE is always one *right* cutting fluid for every machining job — one that will do the job better or faster, or both. Take Rudolph's problem of *rejects*. Here is what one company did about it.

THE OPERATION. Grinding the bearing surface and shoulder on engine camshafts of RC60 hardness.

MACHINES AND WHEELS. Camshaft Grinders with 80 grit wheels.

STOCK REMOVAL. Remove .036" on bearing surface and .012" to .020" on side of shoulder.

PREVIOUS RESULTS. Wheel face dressed after 8 pieces, wheel sides after 3 pieces. *Scrap loss 18%.*

WITH STUART GRINDING OIL. Wheels dressed on face and sides after 18 pieces. *No scrap loss.*

You can secure benefits like this. Ask to have a Stuart Representative call.

Are you receiving Stuart's Shop Notebook regularly?

CONSERVE CRITICAL MATERIALS

Use the RIGHT Cutting Fluid

Metal Show Detroit Oct. 15-19 Visit STUART BOOTH No. A-266

D.A. Stuart Oil Co. LIMITED
EST. 1865

2737 South Troy Street, Chicago 23, Illinois

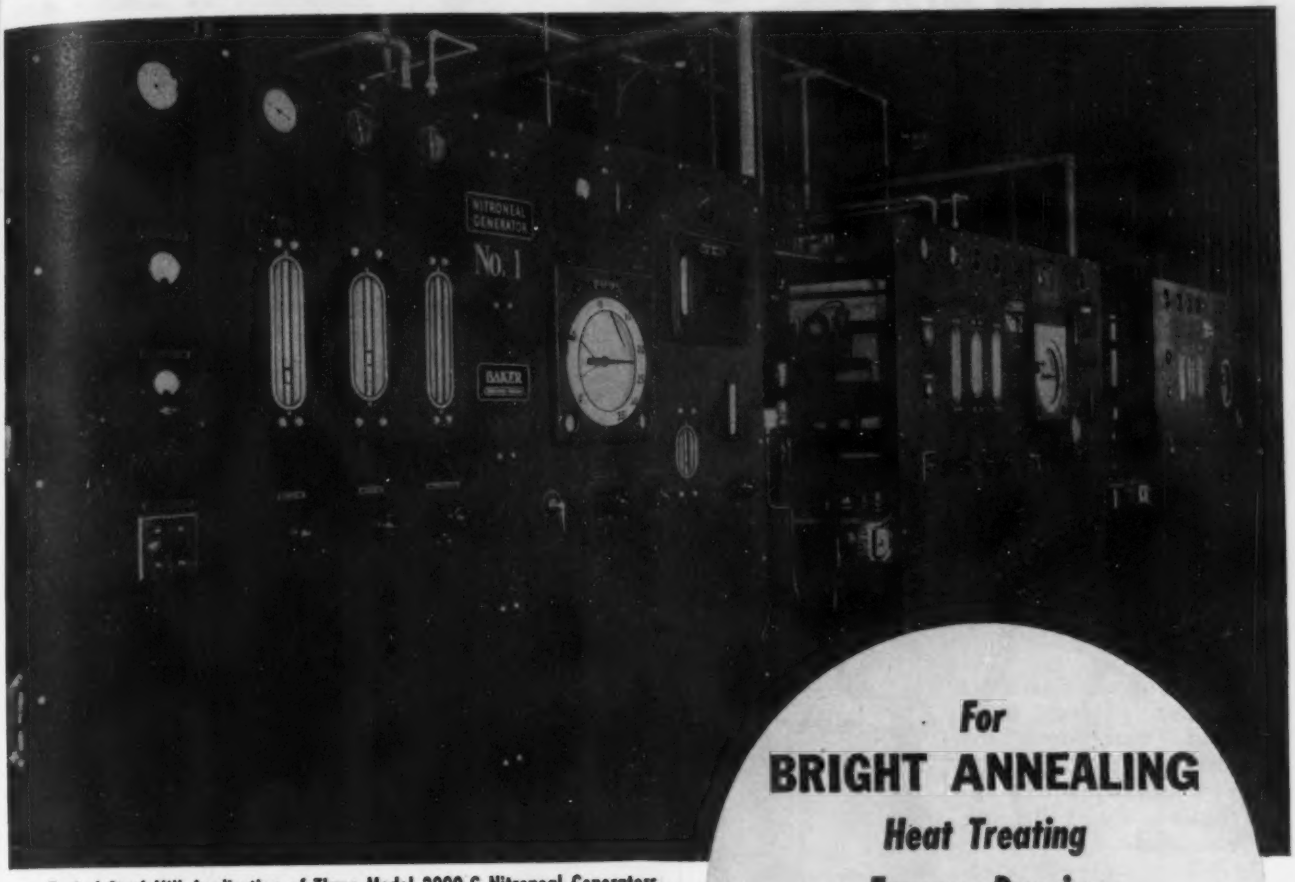
being rolled when the study began in 1944. These were cast into blocks of concrete known as pull-out specimens. Several modifications in design made by the producers because of these tests and other research in recent years demonstrated that bond strength could be increased by better designed deformations. The bars were nominally ½ round, ⅞ in. round and 1⅛ in. square. The 1⅛-in. bars, with two exceptions, were round in cross section with areas equal to 1⅛-in. square bars.

A more elaborate test was devised for the final evaluation of bond strength. Beams 6½ ft long, 8 in. wide, and 18 in. high were cast, with bars embedded 2 in. from the edge of the beam. The purpose was to study the effects of embedding the bar at different depths in the mass of concrete. Beams generally failed in bond. The pull-out specimens failed by splitting of the concrete, except when a plain bar was used.

Bars designed according to tentative specifications developed in the study were also tested. Data indicated two desirable revisions, and the specifications were adopted as an ASTM standard. The standard sets forth requirements and methods of measurement. Definite requirements are included for angle of deformation, average spacing between deformations, average height of deformation and maximum gap between ends of the deformations.

The plain bar gave the least bond, deformed bars gave somewhat higher values and those improved types meeting ASTM specification A305-49 showing the highest bond. As a result of these tests, the American Concrete Institute has revised the provisions of their building code. The allowable bond stresses of the improved types of deformed bars have been increased by 100 pct and those of plain bars reduced. All bars not conforming to the ASTM specification are now classed as plain bars. Only five types of improved bars, as against the original 17, are now in commercial production.

NITRONEAL GAS



Typical Steel Mill Application of Three Model 3000-G Nitroneal Generators

For
BRIGHT ANNEALING
Heat Treating
Furnace Brazing

STAINLESS STEEL
Low and High Carbon Steels
Non-Ferrous Metals

SEE UNIT ON DISPLAY AT METAL SHOW DETROIT OCT. 15-19

NITRONEAL GENERATORS

Available in 100 C.F.H. to 10,000 C.F.H. Capacities

Fundamentally new ammonia-air reactor produces pure nitrogen with a controllable hydrogen content that can be varied at will and maintained at any percentage from .25% to 30% as required.

- **FULLY AUTOMATIC**
- **NO OPERATING PERSONNEL REQUIRED**
- **NO EXPLOSION HAZARD**
- **30% LESS COSTLY THAN DISSOCIATED AMMONIA**

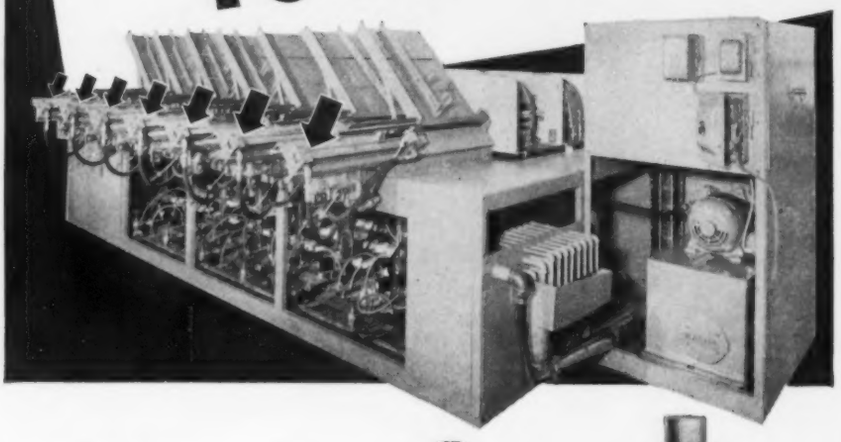
GAS RATIOS PER 1000 CUBIC FEET OF FINISHED NITRONEAL GAS

% HYDROGEN	.25	1.0	3.0	6.0	20.0	25.0	30.0
AMMONIA (c.f.)	301	304	309.3	316.7	350	370	386
AIR (c.f.)	1070	1064	1033	990	790	715	640

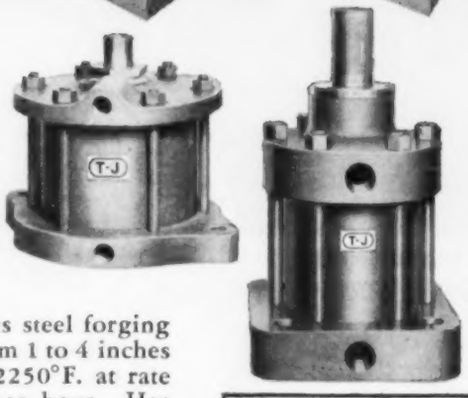
Baker & Co., Inc. 113 ASTOR ST., NEWARK 5, N. J.

Job File No. 3259

Feeds Automatically WITH T-J CYLINDERS



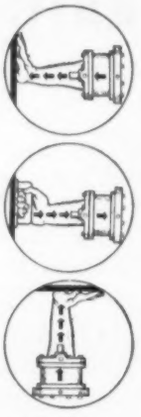
T-J Hydraulic Cylinders furnish efficient, automatic "push power" for feeding devices in this new Ajax-Northrup induction forge heating equipment.



This unit—manufactured by Ajax Electrothermic Corp., Trenton, N. J.—automatically heats steel forging stock in sizes ranging from 1 to 4 inches (rounds or squares) at 2250°F. at rate of 7500 to 8500 lbs. per hour. Has space for 8 heating stations . . . each with *hydraulically operated billet feeding devices employing T-J Cylinders.* These cylinders also eject heated bars automatically. Induction heating with this equipment results in uniformity of successive billets fed to the forge—thus controlling quality of finished forgings and reducing rejects.

Do you have a tough job in power movement—pushing, pulling or lifting? Let T-J help you *simplify machines, save labor* and *cut costs* by using T-J Air or Hydraulic Cylinders! Many standard sizes and styles . . . cushioned or non-cushioned . . . 100 lb. or 50,000 lb. Precision-built, long life. Write for more information. The Tomkins-Johnson Co., Jackson, Mich.

FOR POWER MOVEMENT IN ANY DIRECTION



100 LBS. or 50,000 LBS.

35 YEARS EXPERIENCE

TOMKINS-JOHNSON

RIVITORS . AIR AND HYDRAULIC CYLINDERS . CUTTERS . CLINCHORS

T-J

—Technical Briefs—

Ceramics:

Exceptionally low coefficient of expansion improves shock strength.

A series of new ceramic materials able to withstand extreme thermal shock has been developed by Stupakoff Ceramic & Mfg. Co., Latrobe, Pa. Identified as "Stupalith," this material is being produced commercially in two principle types: with "zero" thermal expansion and with near-zero thermal expansion, either plus or minus.

Ability to resist expansion or contraction with changes in temperature has been vividly illustrated by a series of tests. A sample was heated to 2000°F and plunged into liquid air. The cycle was repeated 100 times without apparent harm.

Basically a wide series of lithium aluminosilicate compositions, the new ceramic group ranges from oxide compositions equivalent to the mineral eucryptite, through the mineral petalite. Certain other compositions closely allied to lithium aluminate-silica also are considered part of the group.

Made from plentiful and non-restricted raw materials, these mineral compounds can be formed by pressing, extruding, casting and ramming. It can be made into parts weighing a fraction of an ounce or several pounds. By machining or grinding after firing, the dimensions of Stupalith parts can be held to precise dimensional tolerances.

This new material can be used at temperatures up to 2400°F, and is believed by the manufacturer to remain stable indefinitely. Samples have been held at 2000°F for periods of 30, 60, 90 and 120 days with no detectable changes in specific gravity or other characteristics.

Its ability to withstand thermal shock makes Stupalith particularly adaptable for pickling bath containers, kiln furniture, induction heating, high temperature jigs, wirewound coil forms, gages, pouring ladles, thermocouple pro-

LOCK UP THE *Better* JOBS

Stands to reason you can't handle many *more* jobs but you can take on better *quality* jobs . . . jobs which return a better profit . . . jobs which demonstrate your top ability.

Well, you can go after and lock up the better jobs when you select King to supply your ring requirements. King bends and welds from bar stock, bands, flanges, angles, special shapes to your specifications. Make King your ring department. Save time, money, material, labor. A phone call, a wire, a letter will start King working as your Ring Department.

King FIFTH WHEEL COMPANY
2915 N. 2ND ST., PHILADELPHIA 33, PA., NE-4-2444

How leading plate glass maker cut cost 5 ways by solving handling problem

EDMONT CASE NO. 209

Problem: How to prevent accidents and improve production efficiency in the manufacture of window glass, an extremely sharp-edged, slippery and fragile material handled in large sheets which must be cut and stacked by hand.

Management Solution: On-the-job tests proved that fabric gloves coated with rough-finished natural rubber on palm and thumb gave workers positive non-slip grip on sheet glass, with maximum protection against cutting injuries; also wore several times longer than other type gloves. (Company name on request.)

Count these 5 cost savings, available wherever sharp, abrasive or slippery materials are handled, with or without the presence of heat, oil, acid, caustic, solvents or degreasants:

1: Fewer lost-time accidents 2: Faster, surer work handling 3: Less spoilage 4: Improved job attitude 5: 40% to 70% saving in usual glove cost to companies or employees.

There's a correct glove for every job
Good management makes it available

To meet different service requirements — tough coatings of NEOX (specially reinforced neoprene), natural rubber or vinyl plastic, bonded to comfortable, sweat-absorbing, insulating fabric.

We offer consulting service on specific problems or complete plant surveys: (Used by Pittsburgh Plate Glass, Bethlehem Steel, Goodyear, Packard, many others.

Without cost or obligation we will gladly study your hand-protection problems and practices, make recommendations and furnish the procedures and materials for complete on-the-job tests. For full information, write our Safety Engineering Service.

Edmont Edmont Manufacturing Company
1234 Walnut Street, Coshocton, Ohio

World's largest maker of coated industrial gloves

tection tubes and other high temperature applications.

Materials Handling:

Fafnir slashes furnace loading time, improves its chip handling.

Mechanized materials handling has reduced the loading time of five annealing furnaces from all day to 2 hr at The Fafnir Bearing Co., New Britain, Conn.

Fafnir uses its materials handling equipment in both standard and unusual ways. Virtually all parts are carried by fork lift or platform trucks at some stage of production. Trucks used for this purpose include 2000-lb capacity fork trucks equipped with rollover forks, and platform-type driver-led Transporters, made by the Automatic Transportation Co., Chicago.

Typical operations include intra-departmental runs of from 200 to 600 ft with bins of partly finished products. This operation has saved a high percentage of handling costs.

The method of loading of the annealing furnaces with forged rings or hoods in cast-iron bins is interesting. A fork truck takes the bins and places them three in a row on the furnace car, which the fork truck then pushes into the furnace.

Another problem solved by mechanical methods is chip and scrap handling. Here, the rollover forks are employed to dump the entire load directly into bins or highway trucks. This technique produced a considerable saving in handling, and the fork truck paid for itself in less than a year.

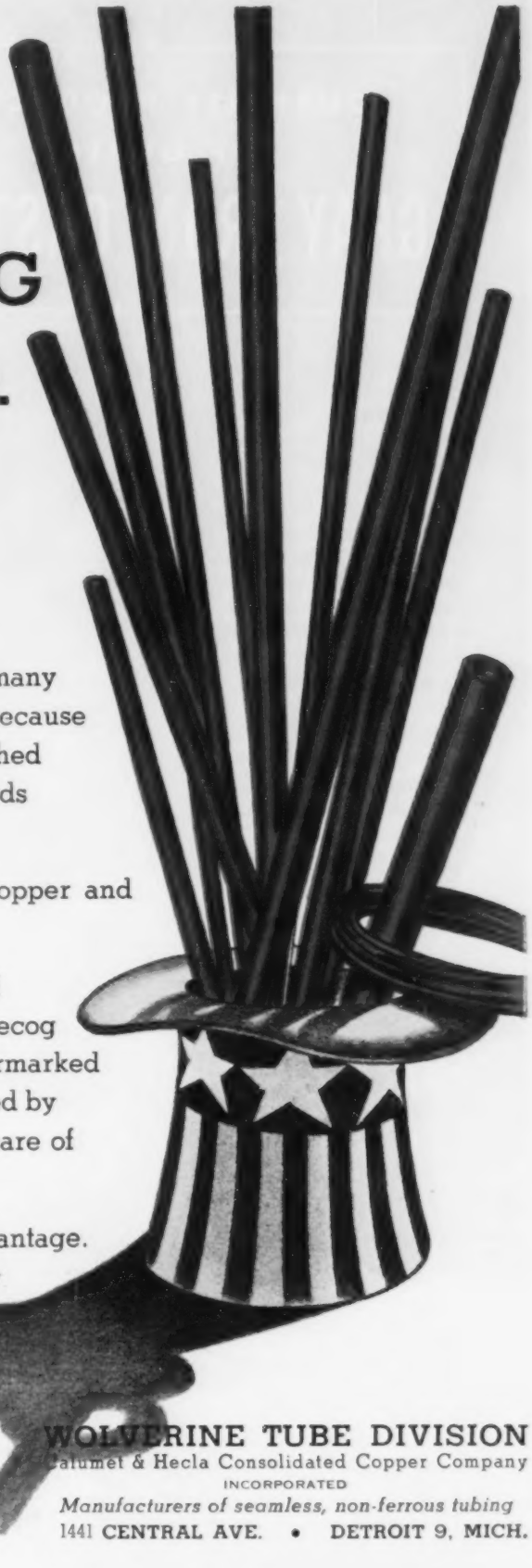
An Automatic Transporter is used to take bearing rings between the temporary storage and the washing, and grinding machines. One Transporter and one man, per shift, handled the job which called for a 4-man crew under the old system.

Millwrights use the fork truck for installing and removing rotors from surface grinders, reducing a 6-hr hoisting, hauling, and repairing job to 40 min.

The Transporters are also doubling for tractors to pull additional hand trucks by means of an eye-

WOLVERINE COPPER TUBING *first* ON D.O.

but we're not forgetting YOU



Copper and copper base alloy tubing is specified on many Defense Orders. Wolverine tubing is often selected because it is, as you know, quality-controlled from ore to finished product and, therefore, conforms to the high standards that must be met.

Incidentally, Wolverine has been manufacturing copper and copper base alloy tubing for well over thirty years.

But like all other manufacturers, we are cognizant of the division of our obligations. Your needs, too, are recog nized. Not all the copper tube we produce daily is earmarked for emergency use. The maximum percentage allowed by government regulations is being produced to take care of essential domestic needs—your other needs.

Whatever tube you can get, utilize it to the best advantage. Employ it judiciously and we shall all get along very well until the emergency is over.

WOLVERINE TUBE DIVISION
Calumet & Hecla Consolidated Copper Company
INCORPORATED
Manufacturers of seamless, non-ferrous tubing
1441 CENTRAL AVE. • DETROIT 9, MICH.

PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA
Sales Offices in Principal Cities

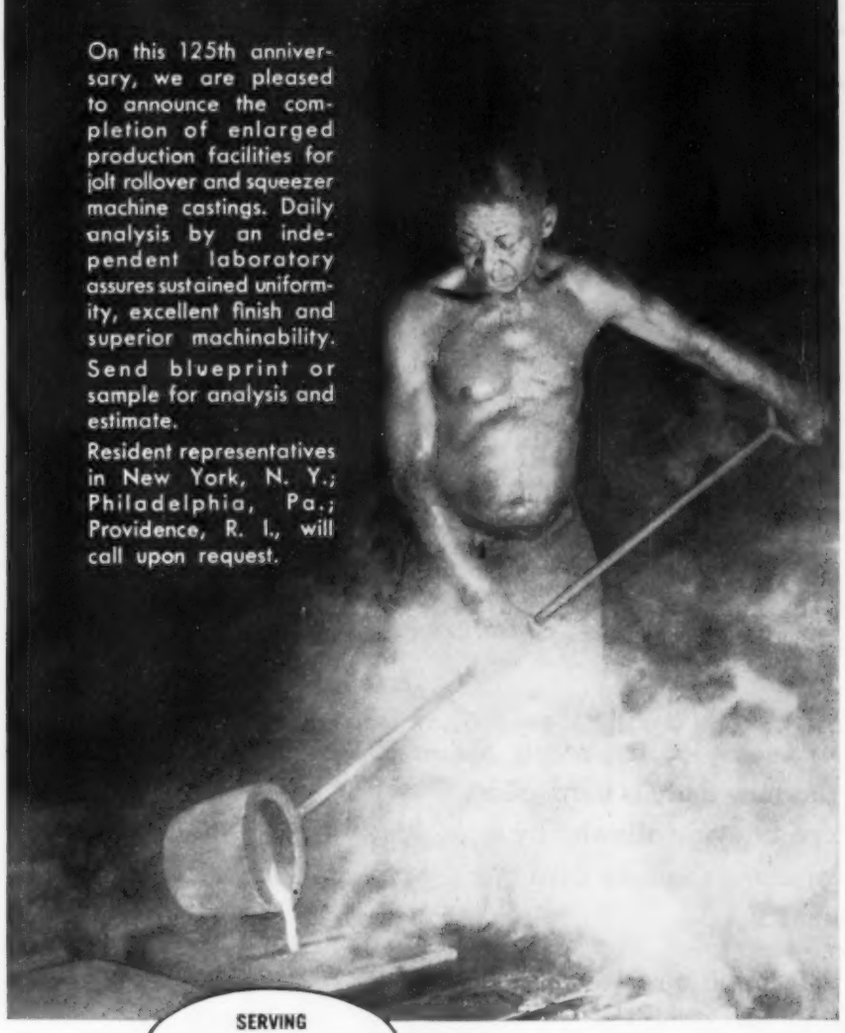
Export Department, 13 E. 40th St., New York 16, N.Y.

QUANTITY PRODUCTION
OF QUALITY
GRAY IRON CASTINGS

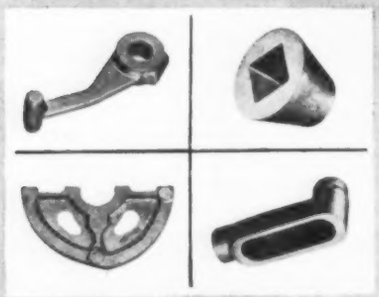
On this 125th anniversary, we are pleased to announce the completion of enlarged production facilities for jolt rollover and squeezer machine castings. Daily analysis by an independent laboratory assures sustained uniformity, excellent finish and superior machinability.

Send blueprint or sample for analysis and estimate.

Resident representatives in New York, N. Y.; Philadelphia, Pa.; Providence, R. I., will call upon request.



SERVING
AMERICAN INDUSTRY
SINCE 1826



with Gray, Malleable, and
Ductile Iron Castings

SACKS-BARLOW
FOUNDRIES, Inc.

NEWARK MALLEABLE
IRON WORKS

357 Wilson Avenue
Newark 5, N. J.

bolt welded to the end of the platform. The Transporter then is used to carry and to tow at the same time.

Detroit Designs Power Saw

Harley Earl Corp., Detroit industrial designers, have designed a new heavy duty metal cutting band saw for Kalamazoo Tank and Silo Co., Machine Tool Div. It raises the question of how far automobile designers are going to penetrate industry.

The procedure in producing the new model saw was something like this: The manufacturer turned over design problems completely to the professional design group. The new machine went through the usual cycle followed in designing automobiles — research, mockups, models — finally the finished machine. The engineer's conception of a band saw was given new functional standards. The saw was completely restyled, color conditioned and given added sales appeal by the auto stylists.

GM Develops New Pressure Meter

A new condenser type engine indicator of unusual range and sensitivity has been developed in General Motors Corp.'s research labs. The indicator is used to record aircraft turbine blade characteristics at 12,000 rpm and 1500°F, and is sensitive to the most minute pressure variation.

GM has been working on pressure indicators since the early days of tetraethyl lead research. Subsequent models have been used on projects far afield of fuel research. The capabilities of this latest indicator will extend it to even wider laboratory applications, the company believes.

Aeromagnetic Survey Photos Ready

First aerial photographs showing the results of the federal-state aeromagnetic survey of the old Katahdin Iron Works and adjacent areas are now available at the State House, Augusta, Maine.

You Can't Ship Acid in Paper Bags!

RETURN EMPTY ACID DRUMS, CARBOYS AND CASES—NOW!

AS THE DEMANDS FOR ACIDS INCREASE, the supply of shipping containers grows smaller by the day.

YOU CAN HELP keep more acid flowing to you and other users by returning containers as soon as possible. So empty your drums, carboys and cases without delay . . . then return them promptly to the shipping locations.

YOU'LL SAVE TWO WAYS: your money won't be tied up in deposit charges; you won't *lose* deposits because of containers lost or damaged during long storage.

Most of all, you'll be helping General Chemical to maintain the prompt, efficient service Industry must have to meet today's demands.

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

Offices: Albany • Atlanta • Baltimore • Birmingham • Boston • Bridgeport Buffalo • Charlotte • Chicago • Cleveland • Denver • Detroit • Greenville (Miss.) Houston • Jacksonville • Kalamazoo • Los Angeles • Minneapolis • New York Philadelphia • Pittsburgh • Providence • St. Louis • San Francisco • Seattle Yakima (Wash.)
In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.
In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

BASIC CHEMICALS
FOR AMERICAN INDUSTRY

KEYSTONE
MUSIC
SPRING WIRE

Does the Trick!

Keystone Music Spring Wire has a smooth way of making production problems disappear for manufacturers of intricate springs and parts.

The structural soundness and uniformity of this ultra-quality wire is attained by careful selection of raw materials, slow and meticulous processing and constant examination from start to finish. Rigid final inspections include coiling, torsion and bend tests which further assure end products of the highest quality.

Scrap Is Vital!

COLLECT EVERY POUND OF SCRAP IN YOUR PLANT AND SELL IT TODAY

Iron and steel scrap, the vital ingredient in steel making, is in critically short supply. In order to keep America's steel industry producing at the highest rate in history . . . the "forgotten" or neglected scrap in your plant is urgently needed.

Search every corner of your plant for obsolete and discarded machinery, plates, sheets, gears, rails, scrap of every description. Sell it to your scrap dealer. More scrap turned IN . . . means more steel turned OUT to supply the tremendous demands of our domestic and defense objectives.

KEYSTONE
STEEL & WIRE CO.
SPECIAL ANALYSIS WIRE. SETTING NEW STANDARDS OF PERFORMANCE
PEORIA ILLINOIS

—Technical Briefs—

Heat Exchangers:

Brazed aluminum heat exchangers successful . . . Could save copper.

Successful fabrication and operation of large brazed aluminum heat exchangers—an outgrowth of World War II aviation experience—have been revealed by The Trane Co.

The units are reported to perform their heat transfer tasks in ¼ the space, with 1/3 the weight, and at approximately ½ the cost of conventional units. Some units pack up to 450 sq ft of heat transfer surface into a cubic foot of space—nine times the surface in a conventional shell-and-tube exchanger with ¾-in. tubes.

The new heat exchangers have a variety of uses in chemical and petroleum processes and the transportation and air conditioning industries. The large "waffle-like" heat transfer "cores" represent an important advance in heat transfer engineering.

The first large aluminum heat transfer units were built late in 1950. They have been operating successfully since mid-February in a large "tonnage oxygen" plant designed and built by Air Products, Inc., Allentown, Pa.

The "tonnage oxygen" units continually withstand application and removal of pressures up to 100 lb psi, while the aluminum walls exchange heat between gases at temperatures ranging from 80° to 300° F below zero.

Units recently built for chemical processes have been tested at pressures up to 1000 lb psi. They are capable of operating at temperatures ranging from 500° to 300° F below zero.

First small brazed aluminum heat exchangers for military aviation orders were made in World War II. Called "intercoolers," these units cooled the hot, high-pressure air from engine superchargers to temperatures suitable for efficient combustion. The units reduced the weight of fighters and bombers.

Following World War II, the

A. P. Green
KX-99
Blast Furnace Linings Produce Record Tonnages for Leading Steel Companies

Complete KX-99 Blast Furnace Linings have produced record tonnages for leading steel companies. Developed after 12 years of continuous research, experimentation and service in actual installations, the properties of KX-99 give you one refractory for the entire furnace lining, including the bottom, hearth, bosh, inwall and top.

KX-99 is also recommended for service in Hot Metal Mixers and Hot Metal Cars.

CHECK THESE OUTSTANDING PROPERTIES OF KX-99

1. *Burned to Orton Cone 23*
2. *No sign of carbon monoxide disintegration in 1,000 hour test at 900° F. In all completed furnace campaigns, no carbon monoxide disintegration was found.*
3. *Apparent porosity in the range of 8 to 12 per cent with an average of 10 per cent.*
4. *Bulk density in the range of 2.30 to 2.40 grams per cubic centimeter.*
5. *Average modulus of rupture 1800 to 2500 pounds per square inch.*

KX-99 Blast Furnace Brick are manufactured to extremely close tolerances . . . uniform in dimensions . . . free from warpage.

A. P. GREEN FIRE BRICK CO.
Mexico, Missouri, U. S. A.
In Canada
A. P. GREEN FIRE BRICK CO., LTD.
Toronto 15, Ontario

A. P. Green REFRACTORY PRODUCTS

★ Other A. P. Green Products PROVED IN SERVICE by the Steel Industry . . .

★ MORTARS – KD-2 • Sairset • Satanite
CASTABLE REFRACTORIES – Kast-Set • Kast-O-Lite
SPOOL CHECKERS
FIREBRICK – Mizzou • Mex-Ko • Clipper • Empire
PLASTIC FIREBRICK – Super Plastic • Plastic Quik Pak

DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE WORLD

SEND FOR *FREE BOOKLET*

A. P. GREEN FIRE BRICK CO., Mexico, Mo.
Please send me a copy of your booklet KX-99 Refractories for the Steel Industry.

Name.....
Firm Name.....
Address.....
City..... Zone..... State.....

COMPANHIA VALE DO RIO DOCE S. A.

Itabira Iron Ore for Open Hearth Furnaces

ANALYSIS PERCENTAGES GUARANTEED BY CONTRACT

Fe (Guaranteed minimum)	68.5
P (Guaranteed maximum)	.045
Moisture (Guaranteed maximum)	1.0

Recent shipments have averaged about .80% moisture, 69.01% Fe, .028% P and .27% SiO_2. Sizes are half inch to eight inches.

Steel companies now using ITABIRA IRON ORE as charge and feed ore report substantial savings in operating costs. These result principally from absence of impurities, low moisture, high iron content and hard structure.

Important economies in steel scrap have also been achieved in open hearth operations by using higher percentages of Itabira Ore in the charge.

Inquiries should be addressed to the Vale do Rio Doce Agency, Room 1611, 63 Wall Street, New York 5, New York.

COMPANHIA VALE DO RIO DOCE S. A.

Rio de Janeiro Brazil

small brazed aluminum heat exchangers received relatively limited use in compressed air coolers and lightweight air conditioners for railroad cars and buses.

Recent expansion of jet aircraft production has resulted in a stepped-up production of the small brazed aluminum heat exchanger.

The units are built up of alternate layers of corrugated fins and flat sheets of aluminum. The units can be designed to transfer heat from gas to gas, liquid to liquid, or liquid to gas.

Unlike conventional heat exchangers that are limited to two streams, the new units may be built with as many as five different streams of gas or liquid. Flexibility of core construction permits engineers to work out almost any combination of circuits, temperature drop and pressure drop.

The tough part in production lies in brazing the sheets of aluminum together at temperatures close to the metal's 1200° F melting point. This is accomplished by pre-heating the assembled cores, then plunging them into a molten salt bath at a temperature of close to 1200° F. The heat of the bath then melts the thin coating of brazing alloy on the surface of the aluminum sheets, producing a strong bond.

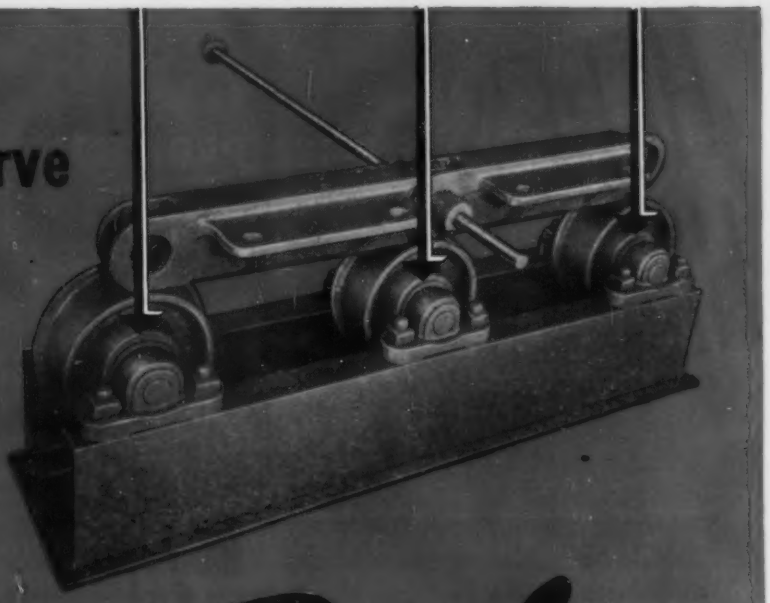
Careful control of raw materials, cleanliness, temperatures, and timing of the operations is essential. It is believed economically feasible to produce the exchangers for manufacture of radiators for automobiles, trucks, tanks or diesel engines. Production of such radiators would be of substantial help in relieving a critical copper shortage, or in reducing weight where lighter weights are needed.

Dry Scrubber Purifier:

High quality vapor possible with new two-stage separation unit.

A dry scrubber purifier with

These Wheels Serve You Best by STANDING STILL



Bailey

STATIONARY WHEEL PIG CASTING MACHINES

Correctly designed for greater production . . . longer service

Increased casting capacity, reduced maintenance and operation costs—these are your benefits from the "stationary wheel" design of Bailey Pig Casting Machines. Bailey Machines feature large diameter idler wheels permanently mounted at intervals on the frame. Along these stationary flanged wheels runs an endless chain of moulds. Through this design 80% of the moving parts of conventional machines are eliminated, and the wheels are located as far as possible from casting heat.

Rugged in design and construction, Bailey Pig Casting Machines have been thoroughly proved by service in ferrous and non-ferrous smelters and foundries.

Foundry Type

Completely self-contained, the complete unit includes the machine proper, motor gear unit, variable speed reducer and drive. Only an electrical connection is required for operation. Capacities: 3 to 50 tons. Sizes: 15 to 125 feet in multiples of 5 feet.

Blast Furnace Type

For heavy duty pig casting this machine is built in sizes from 125 to 250 feet long. Supplied with either single or double strand, it runs over 10 inch diameter idler wheels which assure smooth operation at all speeds. Stationary wheel design assures lower power demands, simplified lubrication of the idler wheels, and no vibration while the pig is solidifying.

WILLIAM M. Bailey COMPANY
ENGINEERS
LEADERSHIP THROUGH QUALITY

1221 BANKSVILLE ROAD PITTSBURGH 16, PA

HERE'S HELP!

to get
MORE PRODUCTION
at
LOWER COST
with your
PRESENT MANPOWER

PRECISION INSPECTION EQUIPMENT

- Quality control gages
- Indicating comparators
- Production and toolroom measuring instruments
- Multiple dimension production gages
- Automatic gaging, classifying, and segregating machines
- Standard precision gages
- Special gaging equipment
- X-Ray continuous measurement gages

MORE PRODUCTIVE MACHINE TOOLS

- Gear burring, burnishing and chamfering machines
- Micro-Form grinders
- Crushtrue grinding equipment
- Thread and form grinders
- Threading machines
- Automatic welders
- Special machine tools

TIME-SAVING THREADING TOOLS

- Solid taps
- Collapsible taps
- Self-opening dieheads
- Thread chasers

CONTRACT SERVICES

- Engineering and design
- Dies of all sizes
- Tooling
- Contract manufacturing
- Forms, threads, precision parts
- Special production machines

Call, wire or write for a qualified Sheffield engineer to help select equipment which best meets your expanded requirements. Address CUSTOMER CONSULTATION SERVICE.

the *Sheffield* corporation

SHEFFIELD

Dayton 1, Ohio, U. S. A.

GAGES • MEASURING INSTRUMENTS • MACHINE TOOLS
CONTRACT SERVICES • THREADING TOOLS

two-stage separation has been designed for use where extremely high quality vapor is required. Capable of delivering vapor containing 1.0 ppm total solids or less, the unit, made by Centrifix Corp., provides internal upflow operation in pressure vessels such as steam drums. The purifier is also said to eliminate need for auxiliary baffles within the drum.

Primary stage separation is accomplished by means of a rectangular-shaped anti-turbulence shield. The shield effectively blocks direct contact of turbulent liquids and spray with the secondary separation chamber behind the shield. The shield consists of a four-wall chamber with corners off-set and overlapping the ends of the side plates. This construction permits the vapor to pass around the plates to the secondary separation unit while causing deflection of splashes and spray away from the secondary unit.

Secondary separation is accomplished by upflow or downflow purifiers enclosed within the anti-turbulence shield. Centrifugal and centripetal forces to achieve separation efficiencies of 99.9 pct or better to provide delivery of clean, dry vapor at all times.

Motion of the vapor is used to separate moisture and entrainment. Due to the non-restrictive design using tangentially-located tuyere vanes to create high-velocity centrifugal action, the dry scrubber purifier is said to perform with almost complete absence of pressure loss.

The unit is simply designed and contains no filter elements or moving parts. These features combined with the self-cleaning action of the dry scrubber purifier eliminates any need for maintenance or servicing, according to the manufacturer.

Installation of the dry scrubber purifier is made to the distributing pan or header within the drum. Several units may be installed to one pan to evenly distribute take-off of vapor if desired. Installation

Doing ONE THING WELL

Economical delivery of large tonnages over short or long distances—from one operation to another if need be (see photo above)—that's the function of the Jeffrey Belt Conveyor. You can depend on Jeffrey Belt Idlers to carry the load. They are built to take severe punishment year after year—roller or ball-bearing troughing or return types. A Jeffrey-engineered material handling system means the best in mechanical efficiency—the best method of doing your particular job, providing economy and long life in the equipment recommended. May we be of service to you?

A LOOK AT THESE MAY HELP: Bin Valves • Bucket Elevators • Chains • Conveyors • Coolers • Car Pullers Crushers • Dryers • Feeders • Idlers (Belt) • Pulverizers • Screens • Packers • Sprockets • Weigh-Feeders Transmission Machinery • • • • *LITERATURE ON REQUEST*

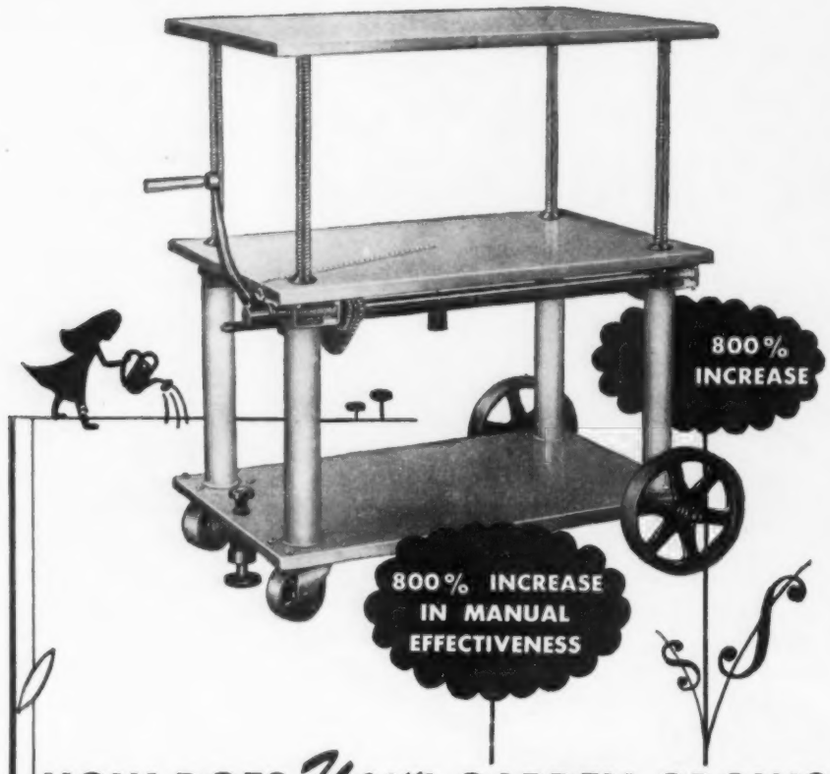
THE JEFFREY MANUFACTURING COMPANY ESTABLISHED 1877

925 North Fourth St., Columbus 16, Ohio

Complete Line of Material Handling, Processing and Mining Equipment

Baltimore 2 Boston 16 Cincinnati 2 Detroit 13 Houston 2 New York 7 St. Louis 1
Beckley, W. Va. Buffalo 2 Cleveland 15 Forty Fort, Pa. Jacksonville 2 Philadelphia 3 Salt Lake City 1
Birmingham 3 Chicago 1 Denver 2 Harlan, Ky. Milwaukee 2 Pittsburgh 22

Jeffrey Mfg. Co., Ltd., Montreal, Canada
British Jeffrey-Diamond Ltd., Wakefield, England
Jeffrey-Galion (Pty.) Ltd., Johannesburg, S. A.
The Galion Iron Works & Mfg. Co., Galion and Bucyrus, Ohio
Galion (Great Britain) Ltd., Wakefield, England
The Ohio Malleable Iron Co., Columbus, Ohio
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio



HOW DOES *Your* GARDEN GROW?

THIS IS BASIC

If you think to maintain profits by increasing prices your prospect is gloomy; for increased prices have a way of hatching increased costs, and bringing their broods home to roost.

To maintain profits, decrease costs!
Decreased costs operate to your benefit three ways.

1. Profits are increased.
2. Competitive position is improved.
3. Distribution is simplified.

All of which is good. . . . None of which is bad.

PORTELVATOR®
REDUCES COSTS

Portelvator, the original worm — worm gear — screw propelled, four-point supported, three table surfaced portable elevating table, will reduce your costs in seven astonishing ways*, by substituting an efficient application of economical, mechanical lifting for your most expensive component . . . brawn.

DO YOU KNOW "THE FORMICA STORY?"

In requesting our Portelvator Bulletin No. P-504, ask also for a copy of "The Formica Story" and learn how one Portelvator user increased manual effectiveness by 800%. Both pieces of literature are free; obey that impulse; write now!

***Ask us about the seven spheres of Beneficent Portelvator Influence.**

THE Hamilton TOOL COMPANY
836 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

of the unit is said to eliminate the need for conventional drum-long baffles normally installed in steam drums.

Data on Metals

Data on high-temperature applications of metals or alloys covering both service records and plant and laboratory tests are being made available to metal users by The International Nickel Co., Inc.

The company's Development and Research Div. has prepared a questionnaire designed to facilitate inquiries on specific high temperature problems to which answers may be found in these files.

The offer of this work sheet is directed to metal users who:

1. Are undertaking a new process with which they have not had operating experience, involving possibilities of corrosion at high temperature.

2. Desire to compare the performance to be expected from other metals and alloys with that of materials previously used and found satisfactory.

3. Require a substitute for an alloy or material at present not readily available.

Fireproof Oil Lines:

Many fires in hydraulic oil lines can be avoided . . . Care needed.

Poor piping design, careless repairs, or neglect may be responsible for oil and hot metal fires in casting plants, forge shops or foundry hydraulic systems. While not a common occurrence, some of these could have been avoided, according to Ransom Tyler of The Oilgear Co.

To meet this problem, much work has been done to develop a fireproof hydraulic oil. There is not yet, however, an approved fireproof oil for use in airplanes. Oil fires in airplanes have been a common hazard and are far more serious than most industrial plant fires resulting from oil.

Industrial fluid power systems

"Tycol Anepro carries heaviest loads... lowers bearing failure... slices lubrication costs"

Indeed it does! Tycol Anepro Greases measure up to severest shock-load conditions encountered in the rolling of steel. They protect bearings from moisture, heat, and abrasive impurities. Anepro's exceptionally high film strength and non-corrosive properties result in far longer bearing life . . . faster rates of production . . . minimum down-time for heavy-duty equipment.

Call or write today for complete information from your nearest Tide Water Associated office.

TYCOL

INDUSTRIAL LUBRICANTS

Boston • Charlotte, N. C. • Pittsburgh
Philadelphia • Chicago • Detroit
Tulsa • Cleveland • San Francisco

TIDE WATER ASSOCIATED OIL COMPANY

17 BATTERY PLACE - NEW YORK 4, N.Y.

SEND FOR A FREE COPY OF "TIDE WATER ASSOCIATED LUBRICANIA"

For
Accurate
Case Depth
and Carbon
Control
we rely on
HEVI DUTY
Carburizing
FURNACES
says
Burgess Norton
MANUFACTURING CO.
• Burgess Norton uses 12 Hevi Duty vertical retort furnaces for carburizing piston pins to rigid case depth and carbon specifications. Metallurgical tests and quality control prove that each pin receives uniform heat treatment. These rugged furnaces operate 24 hours a day, six days a week with minimum down time.
Learn how dependable Hevi Duty vertical retort furnaces provide accurate heat treatment on a production basis. Write for your copy of bulletin HD-646 — today.
See the Hevi Duty Vertical Retort Furnace Booth D-350 at the Metal Show
HEVI DUTY ELECTRIC COMPANY
HEAT TREATING FURNACES HEVI DUTY ELECTRIC EXCLUSIVELY
DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS
MILWAUKEE 1, WISCONSIN

are manufactured to precision tolerances comparable to airplane engines and in many cases operate under just as severe conditions. The use of fire-proof oil in such pumps and equipment may be compared with its use in aircraft engines.

The hydraulic fluid must have high lubrication value to carry high loads and prevent metal-to-metal contact in the close fits found in hydraulic equipment. It must be non-toxic, non-corrosive, stable and not break down into components harmful to equipment.

The fluid should have a viscosity index which will permit its use over the entire range of temperatures which may be encountered. Viscosity must not change with time or use.

It must be compatible with various contaminants which find their way into hydraulic systems. The oil must not promote electrolysis, and should provide a rust-preventive coating to all component parts.

The fluid should not have a foul odor or cause skin disturbances. It must not be volatile. It should be truely fire-proof and not merely have a high flash point.

It is not surprising a fluid with all of these qualities has not yet been found. No doubt, there will eventually be such a fluid developed and produced at a reasonable cost.

Several steps can be taken for fire protection. Oil will not burn if confined in pipe lines and not ignited. We can take all possible precautions to see that the oil in the system is kept in the system. A thorough inspection of all hydraulic equipment with this in mind will go far towards eliminating hazards.

An ideal system for oil piping in hazardous places would have the oil enclosed in strong piping run through conduits to shield it from damage, and conduct leakage oil to the waste pit.

In well designed installations all controls are enclosed in cabinets or on panels. Piping passes to these panels through sheet metal

Are you turning in all your SCRAP?

Don't wait for "George" to do it

IF you are a steel user, this important job of getting more scrap back to the mills is directly up to *you*. You just cannot afford to sit idly by while the scrap shortage gets worse. For unless everyone really pitches into this job of digging out all the scrap possible, steel production is bound to suffer, and every steel user, in more or less degree, will suffer too.

More scrap means *more* steel—it's as simple as that.

Right now some mills have only a bare two-days' supply of scrap on hand. Others have even less. Some steel-making furnaces already have had to shut down for lack of scrap. The situation is serious. Only you can help improve it.

By turning in every piece of worn-out equipment, every obsolete tool and machine, in fact every pound of iron and steel scrap you can comb out of your plant, you'll be helping relieve the worst scrap shortage since Pearl Harbor days . . . and the steel industry will be able to produce more of the steel you need.

Remember—it takes at least one-half ton of scrap to make one ton of steel. To maintain steel's present high production schedules requires more than 1400 carloads of industrial scrap *every* day. So turn in your scrap—ALL your scrap—and keep the mills rolling. This is more than a shortage. It's an emergency that vitally concerns you—and us—and the Nation.

You'll find your local scrap dealers listed in the yellow pages of the phone directory.

This page would ordinarily be used to tell you about

U·S·S CARILLOY STEELS

but, because without SCRAP we cannot produce steel, we are asking instead for your all-out help in getting more SCRAP to the mills.

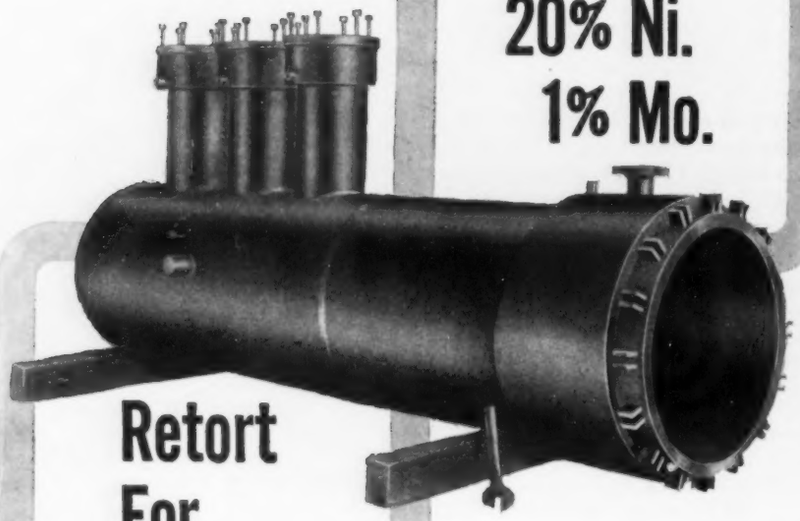
UNITED STATES STEEL COMPANY, PITTSBURGH · COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

1-1348

UNITED STATES STEEL

DURASPUN

30% Cr.
20% Ni.
1% Mo.



Retort
For
Defense
Project

Perhaps the most interesting feature of this Duraspun High Alloy Casting is that four different sizes of centrifugal castings are involved. These vary from 34" to 3½" in diameter. Sections, outlets, collar bands, lugs etc., were all welded together in our shop to form the retort as you see it in the picture. Assembled weight runs around 7,464 pounds.

High alloy castings is our business—not merely the adjunct of an extensive steel founding business. We have the experience — 30 years in the static casting division and 20 years on centrifugal castings. We pioneered both kinds for castings in this country. And we have excellent testing and checking facilities, including a 400,000 volt X-ray machine and gamma-ray units.

If you would like this combination of wide experience, modern shop practice, up-to-date equipment and full testing facilities working on your next high alloy casting, bring it to us.

THE DURALOY COMPANY

Office and Plant: Scottdale, Pa. • Eastern Office: 12 East 41st Street, New York 17, N.Y.

Detroit Office: THE DURALOY COMPANY, 805 New Center Building

Atlanta: J. M. TULL Metal & Supply Co. — Chicago: F. O. NELSON, 332 S. Michigan Avenue — San Francisco: JOHN D. FENSTERMACHER, 1241 Taylor Street

METAL GOODS CORP. Dallas • Denver • Houston • Kansas City • New Orleans • St. Louis • Tulsa

—Technical Briefs—

ducts which can be opened for inspection or repair. Oil, fire-proof or not, should be kept away from the fire.

Systems already installed require critical inspection. Loose, vibrating pipes are a hazard. These frequently break due to work hardening of the metal. Copper pipe is especially vulnerable to vibration and should be used only for pressures under 300 psi.

Use of flexible hose can usually be avoided by telescoping joints, rotary joints, or, if the hose is used only to provide flexibility for adjustment, by two or more unions which may be loosened when the adjustment is to be made. If flexible hose cannot be eliminated, the hose can be enclosed in a box or shroud which can be vented to the sump or waste pit.

Observe the location of small, fragile piping. If located where it can be walked on, run over, or used as a ladder, it should be moved or protected by adequate guards.

Guard against make-shift repairs. Piping changes using malleable iron fittings, wrought iron pipe or welded pipe in a high pressure oil line should be avoided. Pipes bent or strained during installation should be replaced.

Long overhead runs of pipe should be avoided. Failure in their length will spray a film of oil over wide areas.

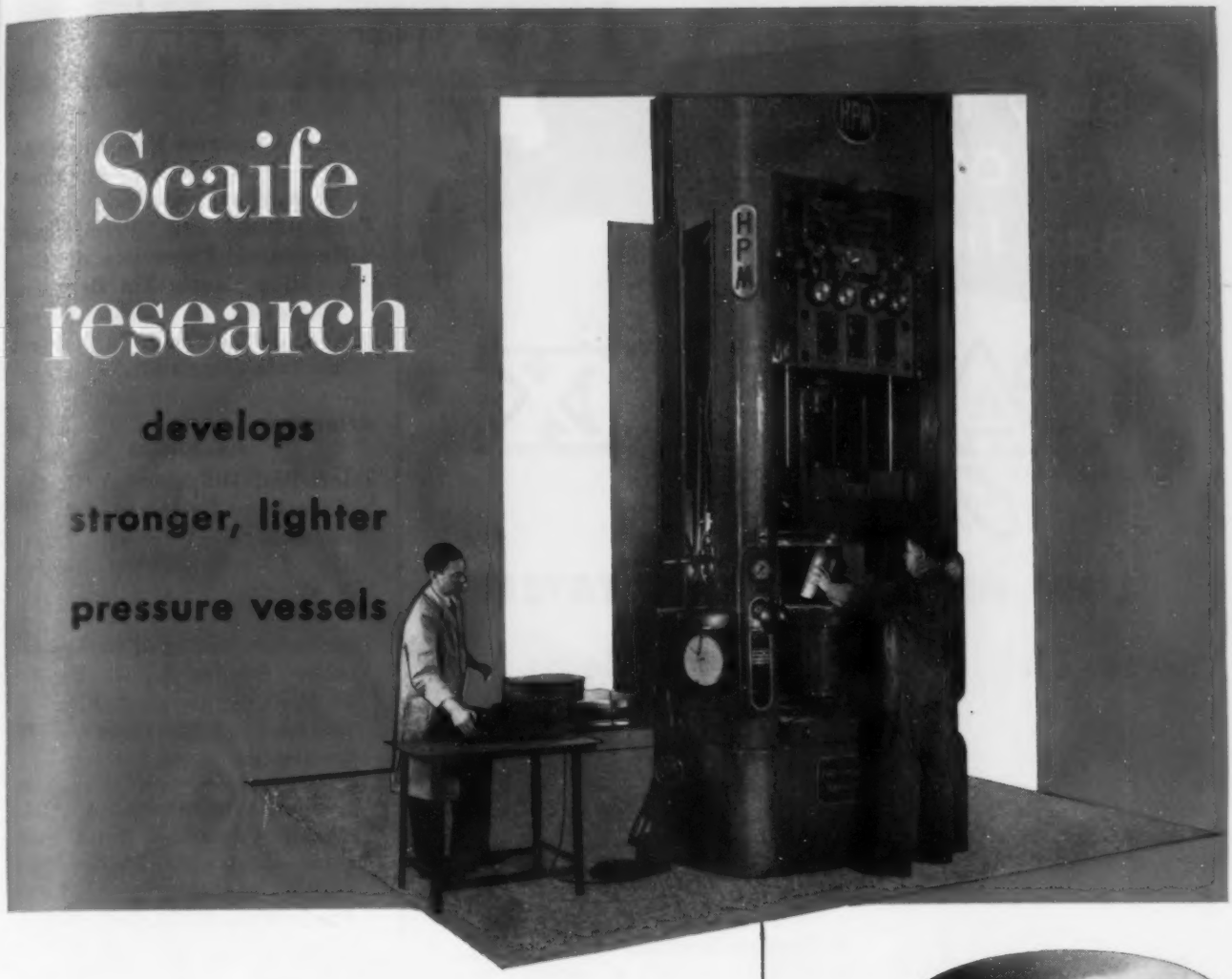
Where pipes pass through floors or partitions between machines, close the opening through which they pass with asbestos packing, to prevent flames from reaching from one floor or machine to another.

Oil flow to machines must be smooth and free from shock. Shock, introduced by sudden or jerky movements in valve operation, can usually be eliminated by properly valving circuit—often at but small expense in longer cycle time.

The time and expense involved in correcting bad practices is often recovered many times over in the cost of the fluid which has been retained in the system.

Scaife research

develops stronger, lighter pressure vessels



The pressure vessels and deep-drawn shapes being made today in the Scaife factory are *better* because of scientific research in Scaife Laboratories. For example, the development of the new Scaife Dura-Lite LP-Gas Cylinder included a complete study of the deep-drawing process, using half-size parts made on the research department press shown above. This procedure, supplemented by complete metallurgical, physical, chemical and specialized studies, permits accurate evaluation of various materials, drawing methods and processing procedure. The result is a better, more serviceable product designed and made on sound engineering principles.

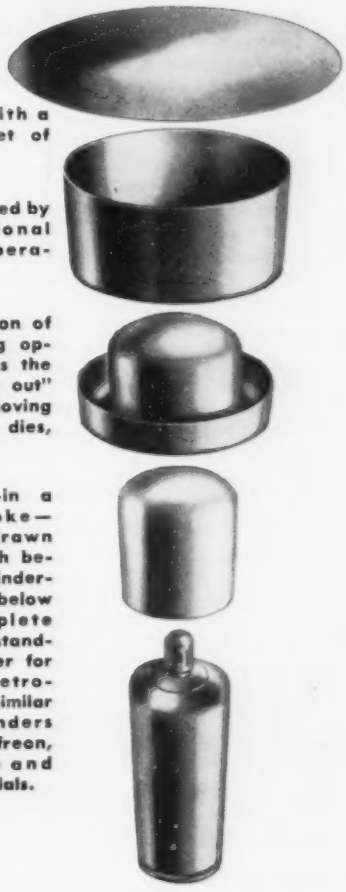
SCAIFE COMPANY

OAKMONT (Pittsburgh District), PENNA.

Makers of Pressure Vessels for Air, Gases and Liquids

FOUNDED 1902

Here is the "big brother" of the press shown at the top of the page. Full-size cylinder-half has been formed in one stroke of the press (see right) and is being removed for processing and assembly.



Starting with a circular sheet of steel—

a cup is formed by a conventional drawing operation.

A continuation of this pressing operation turns the cup "inside out" without removing it from the dies,

completing—in a single stroke—the deep-drawn shape, which becomes a cylinder-half. Shown below is the complete cylinder, a standard container for liquefied petroleum gas. Similar Scaife cylinders are used for freon, acetylene and other materials.

Low Pressure Carbon Dioxide fire extinguishing systems were researched, pioneered, perfected and patented by CARDOX.

Thousands of installations have been made in the nation's leading corporations.

First installation was made in 1939.

Approved by Underwriters' Laboratories, 1940-1941 — Factory Mutual Laboratories 1942.

● Welders working at top speed — quench tanks loaded to capacity — solvents and other flammable liquids handled, pumped or stored in greater quantities — these and dozens of other "hurry-up" factors have made today's fire problems *big, tough and URGENT.*

CARDOX pioneered low pressure carbon dioxide systems and mobile units to meet just such conditions. CARDOX Low Pressure CO_2, applied as easily in tons as in pounds, extinguishes fires often uncontrollable by other means — causes no extinguishment damage. It may be used to protect one hazard or *all* the critical hazards in a plant. Millions of dollars in research — decades of experience condensed by war and high priority projects into a dozen years — have enabled CARDOX to save industry uncountable fire losses.

Let us analyze *your* fire hazards. Our survey costs you nothing — but it may save you from crippling property damage and production stoppage. Write for this survey today.

CARDOX CORPORATION

** Cardox Low Pressure Carbon Dioxide Systems and Equipment are covered by U.S. and Foreign patents issued and pending.*

BELL BUILDING • CHICAGO 1, ILLINOIS • Offices in Principal Cities

Program

Continued from Page 224

sium-Aluminum-Manganese Alloys—R. J. Nelson, Aluminum Company of America.

Constitution and Precipitation Hardening Properties of Copper-Rich Copper-Tin Beryllium Alloys—R. A. Cresswell and J. W. Cuthbertson, Tin Research Institute (England).

Afternoon

ASM—DIFFUSION

Interstitial Diffusion—A. G. Guy, Associate Professor of Mechanical Engineering, University of North Carolina, Raleigh, N. C.

The Carbonitriding of Carbon and Alloy Steels—H. C. Fiedler, M. B. Bever and C. F. Floe, Department of Metallurgy, MIT, Cambridge, Mass.

Chromium Diffusivity in Alpha Cobalt Chromium Solid Solutions—John W. Weeton, Research Metallurgist, Lewis Flight Propulsion Lab., NACA, Cleveland.

Anisothermal Diffusion of Carbon in Austenite—J. E. Black, Captain, Ordnance Department, U. S. Army, Detroit Arsenal, Detroit, and G. E. Doan, Professor and Head, Department of Metallurgical Engineering, Lehigh.

AWS—RESISTANCE WELDING

Seam Welding Containers Automatically—C. S. Seltzer, Swift Electric Welder Co.

Spot and Seam Welding of Nimonic and Similar Heat-Resistant Alloys—J. Solomon, Sciaky Bros., Inc.

Temperature Distribution During the Flash Welding of Steel—Ernest F. Nippes, W. F. Savage and J. J. McCarthy, Rensselaer Polytechnic Institute.

AWS—WELDABILITY

Microcracks and the Low-Temperature Cooling Rate Embrittlement of Arc Welds in Mild Steel

Turn to Page 334

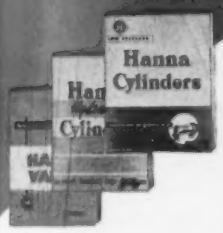
CYLINDER POWER increases production

UP TO 100%...

Use It 1001 Ways For Pushing, Pulling, Lifting, Pressing, Clamping, Controlling

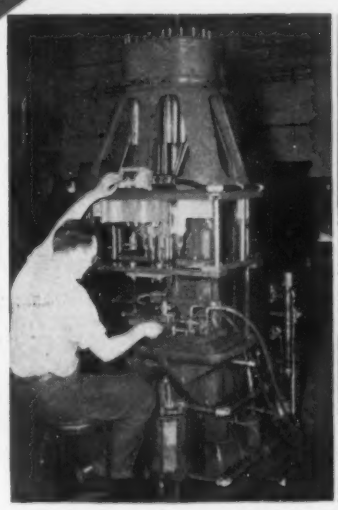
INVESTIGATE Hanna Cylinder Power to speed production and lower costs. Hanna Air and Hydraulic Cylinders are used in hundreds of applications throughout industry—in all types of machines and equipment—to get things done faster, relieve tiresome manual operation, simplify actuation and control. Cylinder Power is easily adaptable, safe and inexpensive!

HANNA AIR and HYDRAULIC CYLINDERS



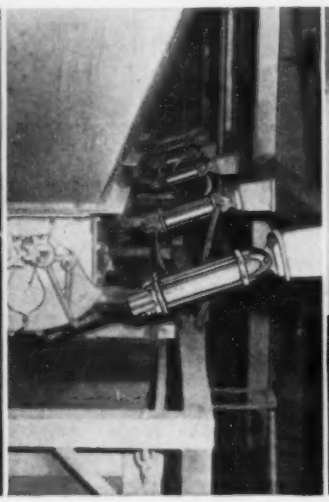
Send for Catalogs

Ask for Catalog No. 236 for Hanna Low Pressure Cylinders — Catalog 233A for Hanna Hydraulic Cylinders and Catalog 254 for Hanna Valves.



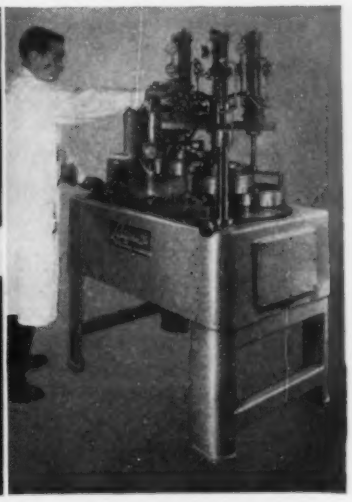
REDUCES FATIGUE

One pushbutton starts the Natco cycle for continuous, automatic operation of this drilling machine. Hanna Hydraulic Cylinders feed the table and Hanna Pneumatic Cylinders engage drillpress clutch and workpiece clamp.



REMOTE CONTROL

What could be more simple and dependable for opening and closing these hopper gates than Hanna Cylinders? They are operated from remote station with Solenoid Valves and Pushbutton Panel.



DOUBLES PRODUCTION

Hanna Air Cylinders raise and lower the entire conditioning ring-pressure plate units to permit fast, efficient loading and unloading of parts on this Lapmaster. In many cases, production has been doubled over manual operation.

Hanna Engineering Works

HYDRAULIC AND PNEUMATIC EQUIPMENT . . . CYLINDERS . . . VALVES . . . RIVETERS

1750 Elston Avenue, Chicago 22, Illinois

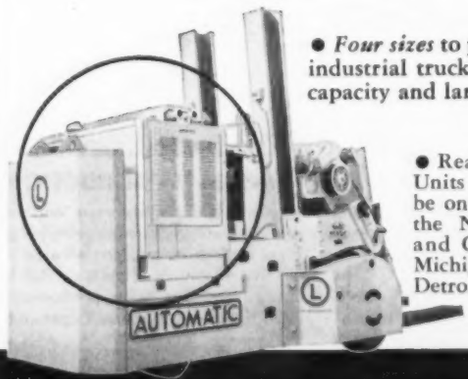
NEW!

READY-POWER

Diesel-electric units

FOR HEAVY-DUTY ELECTRIC INDUSTRIAL TRUCK OPERATION

• Featuring amazingly low-cost operation, long life and reduced maintenance.



• *Four sizes* to power electric industrial trucks of 6,000 lb. capacity and larger.

• Ready-Power Diesel-Electric Units and Gas-Electric Units will be on display in booth G-131 at the National Metal Exposition and Congress, October 14-19, Michigan State Fair Grounds, Detroit.

The READY-POWER Co.

3822 Grand River Ave., Detroit 8, Michigan

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

— Program —

—Prof. A. E. Flanigan, Dept. of Engineering, University of California.

Effect of Sub-Critical Cooling Rate on Strain and Quench Aging of Structural Steels—C. Felmley, C. Hartbower and W. S. Pellini, Metallurgy Div., Naval Research Lab.

AWS—NONFERROUS

Tensile Tests and Metallurgical Studies of Welded Copper Joints—R. J. Mosborg, R. W. Bohl, F. L. Howland and W. H. Munse, Dept. of Civil Engineering, University of Illinois.

Welding Iron-Bearing Alpha Aluminum Bronze—F. Emergy Garriott, Weldrod Dept., Ampco Metal, Inc.

Pressure Welding Aluminum at Various Temperatures—M. A. Miller and G. W. Oyler, Aluminum Research Labs.

Testing of Porcelain Enamels and Ceramics with Statiflux.

Stress Analysis by Magnetic Means.

Sensitivity Limits in Fluoroscopy.

Radiographic Porosity Standards vs. Tensile Properties of Light Alloy Castings.

AIME—SEMINAR—DISLOCATIONS IN METALS

Nature of Dislocations—Frederick Seitz, University of Illinois.

Role of Dislocations in Crystal-Growth and Grain-Boundary Phenomena—W. T. Read, Bell Telephone Laboratories.

Evening

AWS—PRESIDENT'S RECEPTION

AIME—SEMINAR—DISLOCATION OF METALS

Theories of Dislocations as Applied to Mechanical Behavior—Egon Orowan, Massachusetts Institute of Technology.

Tuesday, Oct. 16

Morning

ASM—HIGH TEMPERATURE ALLOYS

The Formation of Sigma Phase in

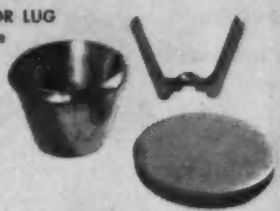
Creative METAL STAMPINGS

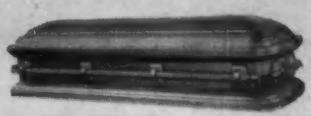
Save METAL - TIME - COST
for Prime Contractors of products for the Armed Services

A few of the many military metal stampings produced by the LEAKE organization

COVER
40 mm. BOFORS AA GUN—1/2 in. steel plate—125 lbs.

ELECTRICAL CONNECTOR LUG
Heavy Gauge Copper Tubing




RADIO PROXIMITY FUSE HOUSINGS SIGNAL CORPS—Silver Brazed Assembly

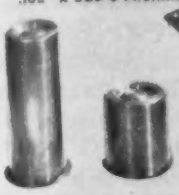
QMC REPATRIATION CASKET STAMPINGS: Lid, Body, Base, Moldings, Rings, Plates, Clips

USAF NAPALM BOMB BAFFLES .102" x 52S-0 Aluminum

COLD EXTRUDED CUPS
Steel Cartridge Cases

AIRCRAFT ALUMINUM WHEEL FAIRINGS

ORDNANCE CAPACITOR CAN—Deep Drawn Brass


NAVAL OIL FILTER SHELLS
Deep Drawn Brass and Steel

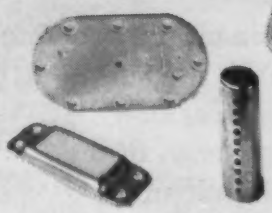
HALF TRACK GUIDE & CROSS PLATES SAE-4140 Steel

ORDNANCE BOOSTER CASINGS

HEAD & BASES FRAGMENTATION BOMBS
21,000 each daily

MAIN BEARING AIRCRAFT ENGINE

ORDNANCE BOMB FUSE ADAPTER—5/16-in. Drawn Steel Plate

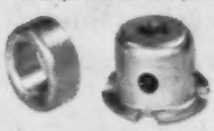


IDLER WHEELS FOR TANKS
1/4-in. steel—15-in. dia.

TIMER HOUSING—NAVAL DEPTH CHARGE—Deep Drawn Naval Brass and Steel

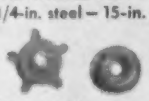
"WATER BUFFALO" STAMPINGS
Heavy Gauge SAE-4130 Steel

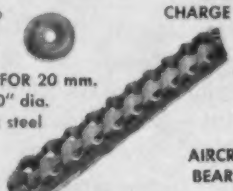
40 mm. BOFORS AA GUN: Stamped Brass Components


INCENDIARY BOMB STAMPINGS CHEMICAL WARFARE BRANCH

TANK SEAT BACK STAMPING

AERIAL DEPTH CHARGE STAMPINGS


BASE PLUG FOR 20 mm. SHELL—.550" dia. x .114" thick steel



AIRCRAFT SUPERCHARGER BEARING SAE-4145 Steel

SERUM BOTTLE HOLDER ARMY MEDICAL DEPARTMENT

HEAVY GAUGE TANK STAMPINGS

CONVERSION BOOKLET

28 pages... 32 illustrations of creative metal stampings produced by modern LEAKE techniques for military and civilian purposes. Single copies free when requested on your letterhead. Quantities at nominal cost.

THE LEAKE ORGANIZATION *can furnish metal stampings in* ANY SIZE • ANY THICKNESS • ANY SHAPE • ANY ANALYSIS

THE LEAKE STAMPING COMPANY · MONROE, MICHIGAN

LEAKE

EXPERTS IN PRESSED METAL

COMPLETE PRESSROOM—MACHINE SHOP
HEAT TREAT—BRAZING—WELDING
TESTING AND INSPECTION

Jet blades cleaned and rust protected in one spray washer

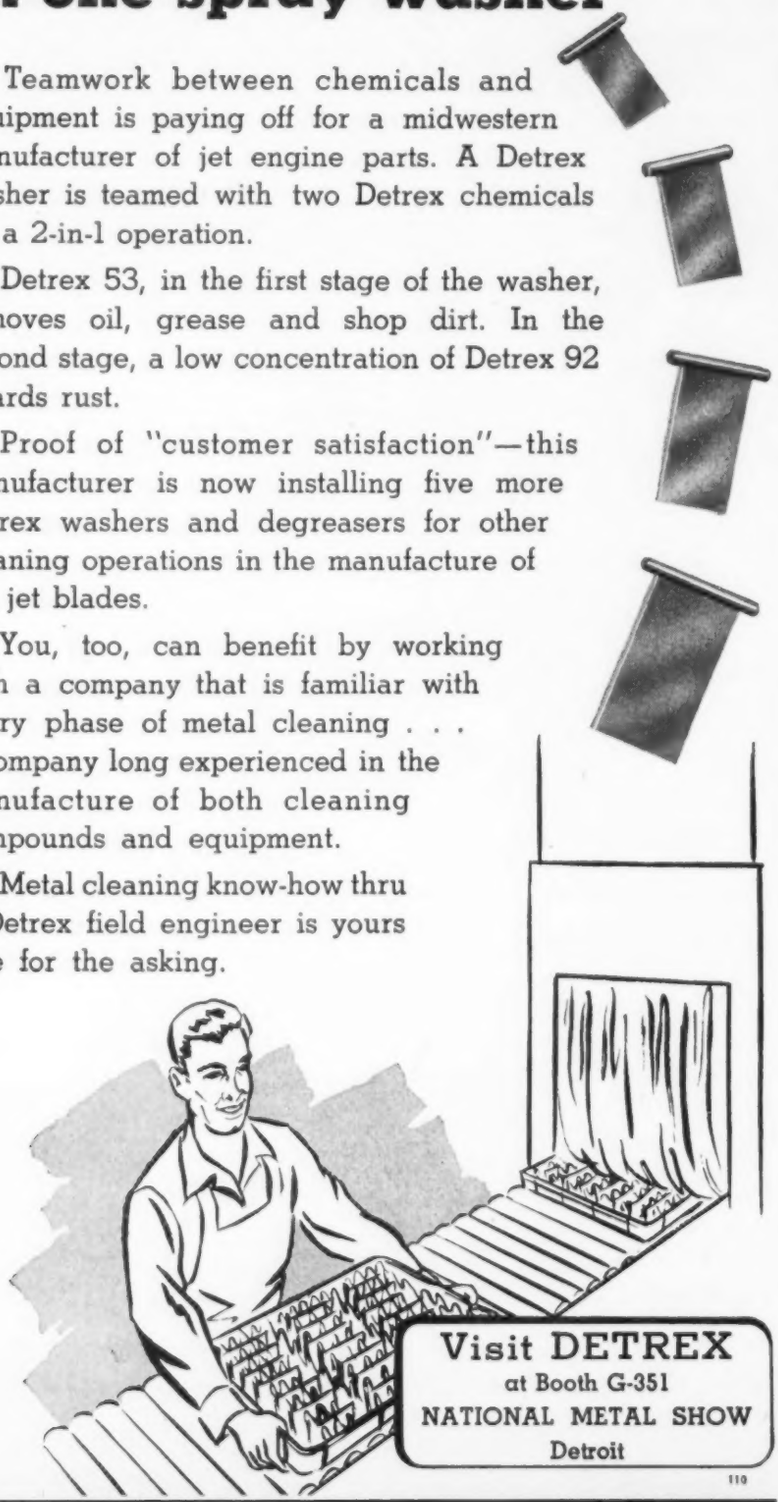
Teamwork between chemicals and equipment is paying off for a midwestern manufacturer of jet engine parts. A Detrex washer is teamed with two Detrex chemicals for a 2-in-1 operation.

Detrex 53, in the first stage of the washer, removes oil, grease and shop dirt. In the second stage, a low concentration of Detrex 92 retards rust.

Proof of "customer satisfaction"—this manufacturer is now installing five more Detrex washers and degreasers for other cleaning operations in the manufacture of the jet blades.

You, too, can benefit by working with a company that is familiar with every phase of metal cleaning . . . a company long experienced in the manufacture of both cleaning compounds and equipment.

Metal cleaning know-how thru a Detrex field engineer is yours free for the asking.



DETREX Corporation
BOX 501, DETROIT 32, MICH.

Program

13 to 16 pct Chromium Steels—H. S. Link and P. V. Marshall, U. S. Steel Co., Research & Development Lab., Pittsburgh.

Electrolytic Etching—The Sigma Phase Steels—John J. Gilman, Crucible Steel Company of America, Research Laboratory, Harrison, N. J.

Phase Changes Associated With Sigma Formation in 18-8-3-1 Chromium-Nickel-Molybdenum-Titanium Steel—K. W. Bowen and T. P. Hoar, Cambridge, England.

Composition Limits of Sigma Formation in Nickel-Chromium Steels at 1200°F. (650°C.)—M. E. Nicholson, Assistant Professor, The Institute for the Study of Metals, University of Chicago, Chicago; C. H. Samans, Associate Director, Materials Division, Standard Oil Co. (Indiana), Chicago, and F. J. Shortsleeve, Research Assistant, Case Institute of Technology, Cleveland.

Ferrite Formation Associated with Carbide Precipitation in 18-CR—8-Ni Austenitic Stainless Steel—E. J. Dulis and G. V. Smith, Research Laboratory, U. S. Steel Co., Kearny, N. J.

ASM—MECHANICAL METALLURGY

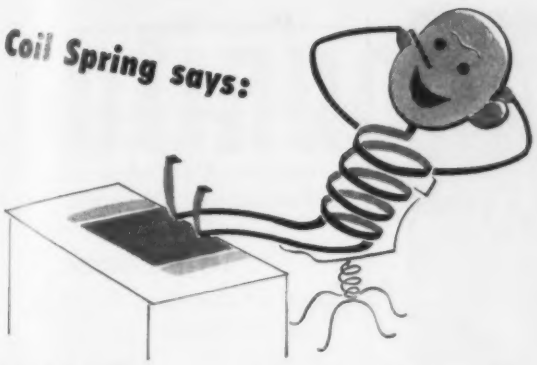
The Determination of Flow Stress From a Tensile Specimen—E. R. Marshall, Instructor of Metallurgy, and M. C. Shaw, Associate Professor of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge.

Plastic Deformation of Zinc Bicrystals—T. Kawada, Tokyo, Japan.

The Mechanical Properties of Iron and Some Iron Alloys of High Purity—W. P. Rees, Middlesex, England.

Crystal Orientation in Cold-Rolled Silicon Steel Sheet—I. Gokyu and H. Abe, Tokyo, Japan.

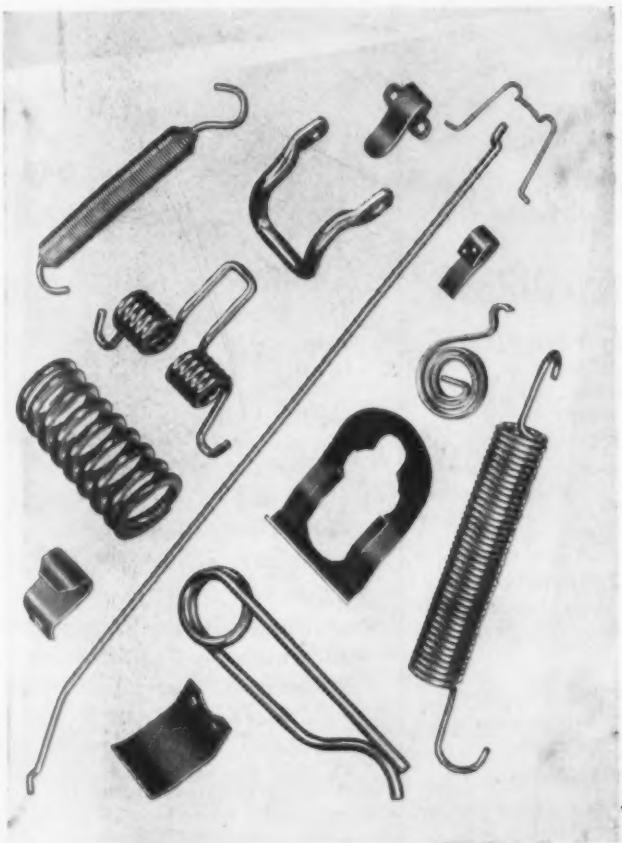
Delayed Yield in Annealed Steels of Very Low Carbon and Nitrogen Content—D. S. Wood, Assistant Professor, and D. S.



"RELAX . . . LET US SOLVE YOUR SPRING PRODUCTION PROBLEMS"

● We can help you bring production costs down by supplying you with springs and small parts engineered **exactly** to specifications. Our system of continuous inspection eliminates misfits—saves you valuable time on the assembly line. Whether you order springs in limited quantities or long production runs, each item receives the same expert attention.

No order too large or too small!



The U. S. STEEL WIRE SPRING Co.
7800 FINNEY AVE. • MICHIGAN 1-6318
CLEVELAND 5, OHIO

2*† PROVEN PRODUCTION PACKAGES FOR DOUBLE-DUTY IN YOUR PLANT

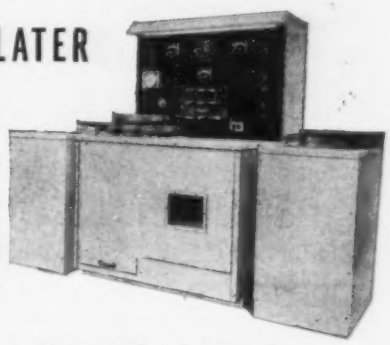
*THE CRO-HONE PRESSURE-BLAST

A COMPACT, LOW-COST WET-BLASTING UNIT . . . EASILY INSTALLED . . . EASILY OPERATED

The Cro-Hone Pressure-Blast can be operated at *lower velocities* for general surface finishing, pre-plating or pre-painting cleaning and the maintenance cleaning of all kinds of metal parts, tools, dies, molds, etc. At *greatly increased* velocities the unit is immediately adaptable to difficult descaling jobs and the close tolerance deburring of intricate recesses, spirals and long internal bores. (Uses a range of metallic or non-metallic abrasives from 45 to 5000 mesh)

†THE CRO-PLATER

A FULLY SELF-CONTAINED PRECISION HARD-CHROME PLATING UNIT



All necessary controls, rectifiers, switches, heating elements, etc. are built into the Cro-Plater. Easy to install and easy to operate, the unit can be used as an integral part of a high production plating set-up or for occasional use in the toolroom, pilot plant or laboratory. The work that can be effectively plated in the Cro-Plater is not limited in any way by available amperage. (Cro-Sol, a specially designed high-speed chrome plating solution, is offered to purchasers of the Cro-Plater.)

Together, the Cro-Hone Pressure-Blast, as the pre-plating cleaning agent, the Cro-Plater, represent a complete electroplating installation.

For the Complete Story Fill in This Coupon and Mail To —

The CRO-PLATE Company, Incorporated
HARTFORD 5, CONNECTICUT

Dept. A-2

Please send me more detailed information on the Cro-Hone Pressure-Blast, and the Cro-Plater.

NAME:
TITLE:
COMPANY:
ADDRESS:

Metal Enclosures—and Truck Bodies Too

Save manpower— Speed Production

LINDSAY PREFABRICATED METAL ENCLOSURES

Shipped K/D for Quick Assembly in Your Plant

All types of metal enclosures—for mobile or stationary structures—can be quickly assembled from die-formed standardized LS components . . . available in mild steel, stainless steel, or aluminum. Single line drawing only design necessary.

Lindsay Structure—the modern method of light metal construction—uses components that are fabricated in 78,085 panel sizes. All parts are precisely cut for exact fit . . . can be easily assembled with standard tools . . . no cutting, fitting, welding, or riveting on the job.

Lindsay Structure has almost unlimited applications—cabinets, housings, refrigerator buildings, processing rooms, bodies for trucks, trailers, buses, etc.

Put this versatile prefabricated material to work for you . . . save skilled labor, conserve space, speed production. Nationwide assembly facilities available for sub-contracts, if desired. For full information write or call

LINDSAY STRUCTURE, INC.
5000 West Dempster St., Skokie, Illinois
Phones: COrnelia 7-5770—Skokie 6220

Program

Clark, Associate Professor, Department of Mechanical Engineering, California Institute of Technology, Pasadena, Calif.

AWS—SHIP STRUCTURE

Work of the Ship Structure Committee—Rear Admiral K. K. Cowart, U. S. Coast Guard.

Low-Carbon Steel: Subcritical Heating vs. Transition Temperatures—L. J. Klinger, E. R. Evaneskes and Wm. M. Baldwin, Case Institute of Technology.

Studies of Tests for Evaluating Welded Ship Steels—C. B. Voldrich and P. J. Rieppel, Battelle Memorial Institute.

Stress Studies of Bulkhead Intersections for Welded Tankers—W. R. Campbell and L. K. Irwin, National Bureau of Standards.

The Influence of Composition and Steelmaking Practice upon Ship-Plate Quality—H. M. Banta, Battelle Memorial Institute.

AWS—FUNDAMENTAL STUDIES OF ARC WELDING

The Effect of Power Supply Characteristics on D.-C. Welding—Jack B. Keyte, Dept. of Welding Engineering, Ohio State University.

Welding Characteristics of Submerged Arc with Three-Phase Power—E. A. Clapp, Union Carbide and Carbon Research Labs., Inc., and Norman G. Schreiner, Linde Air Products Co.

Tools for Predetermining Preheat and Interpass Temperatures for Submerged Arc Welds—Clarence E. Jackson and Arthur F. Shrubsall, Union Carbide and Carbon Research Lab., Inc.

AWS—INSPECTION TRIP

Arrangements have been made for an Inspection Trip to the plants of the Ford Motor Co.

SNT

Magnetic Particle Inspection Methods (Including recent developments in photoelectric and

Continuous production

with a CHIP-TOTE

Machine tool production increased through constant removal of chips, turnings and borings.

Eliminates shut-down and reduces waste handling.

The CHIP-TOTE conveyor continuously removes wet or dry chips, turnings and borings from multiple-spindle or automatic machines. Speed of operation can be synchronized with the metal-removing capacity of any standard or special machine.

The scrap material is channeled onto the May-Fran hinged-steel conveyor belt, carried horizontally until clear of the machine's working mechanism, and then transported up a steep incline for discharge into tote box or onto a carry-off conveyor system.

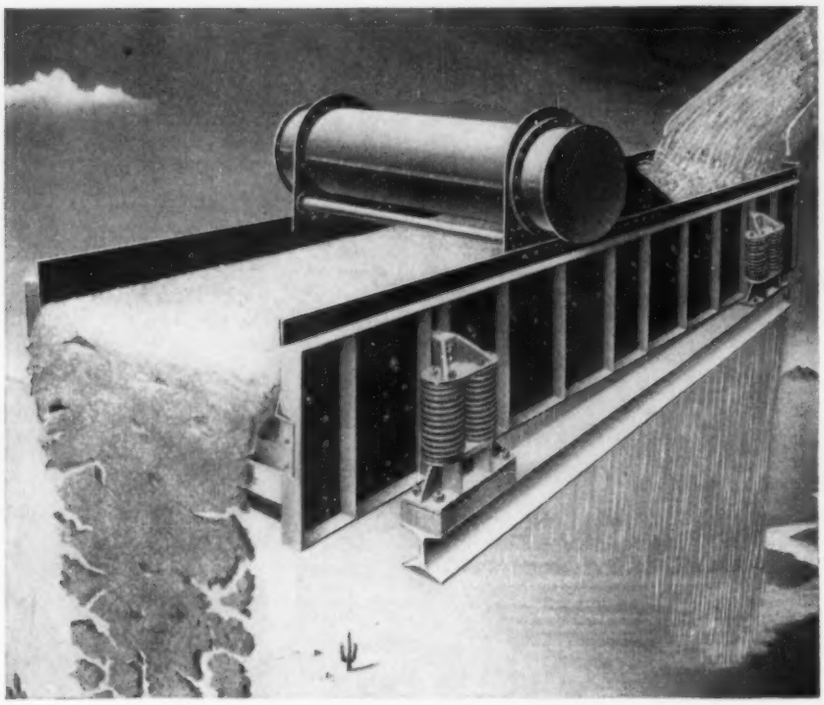
A CHIP-TOTE conveyor eliminates shut-down of vital equipment, stops waste of skilled workers' time, and provides for continuous production. Let a May-Fran CHIP-TOTE solve your production problems . . . automatically and efficiently.

WRITE TODAY FOR THE NEW CHIP-TOTE CATALOG.

160-MF

MAY-FRAN ENGINEERING, Inc.

1698 CLARKSTONE ROAD, CLEVELAND 12, OHIO



"SEPARATION CENTER" FOR SURFACE MOISTURE

Surface moisture removal is essential in processing many bulk materials. Effective dewatering at required speeds and capacities is a Hewitt-Robins specialty.

The Eliptex Dewaterizer® . . . a Hewitt-Robins "first" . . . has proved its versatility in removing surface liquid from bulky solids, granular materials and fibers alike—and for recovering solids, effluent, or both. Unique vibratory action and patented deck* assure consistent, economical performance in "damp-drying" coal, petroleum coke, slurry, wood bark or pulp, aggregates, fine limestone or other wet substances.

If dewatering bulk materials is vital to your production . . . if inadequate removal of surface moisture affects product quality, output or economy . . . it will be worth while to explore the space- and labor-saving advantages of the Hewitt-Robins Eliptex Dewaterizer.

Hewitt-Robins has long been a pioneer in the development of vibrating machinery for dewatering, sizing, purifying and shaking out bulk materials—and for salvaging fines from waste. If any of these problems are *yours*, we invite you to make them *ours*.

*U. S. Patents 2,200,724 & 2,457,018

HEWITT HR ROBINS

Executive Offices: 370 Lexington Avenue, New York 17, N. Y.

HEWITT RUBBER DIVISION: Belting, hose and other industrial rubber products

ROBINS CONVEYORS DIVISION: Conveying, screening, sizing, processing and dewatering machinery

ROBINS ENGINEERS DIVISION: Designing and engineering of materials handling systems

Hewitt-Robins is participating in the management and financing of Kentucky Synthetic Rubber Corporation

magnetic scanning of indications.)

AIME—TRANSFORMATIONS

Rapid Tempering of High-Speed Steel—A. E. Powers, General Electric Co., and J. F. Libach, Lehigh University.

Effect of Rate of Cooling on the Alpha-Beta Tranformation in Titanium and Titanium-Molybdenum Alloys—Pol Duwez, California Institute of Technology.

Burst Phenomenon in the Martensitic Transformation — E. S. Machlin and Morris Cohen, Massachusetts Institute of Technology.

Isothermal Formation of Martensite at Sub-zero Temperatures in a High Chromium Steel—C. S. Das Gupta, University of Notre Dame, and B. S. Lement, Massachusetts Institute of Technology.

Isothermal Transformation and Properties of a Commercial Aluminum Bronze—A. H. Kasberg, Jr., Westinghouse Electric Corp., and D. J. Mack, University of Wisconsin.

AIME—ALLOY SYSTEMS II

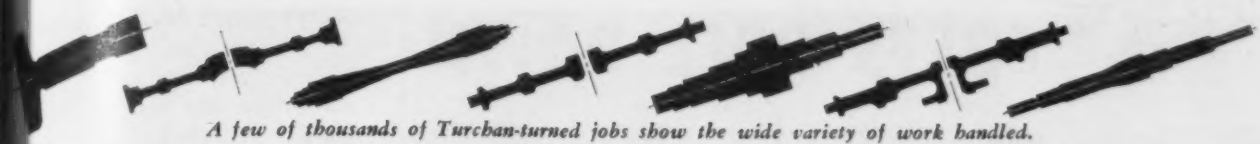
Crystal Structure of UAl_4—B. S. Borie, Jr., Oak Ridge National Laboratories.

Intermediate Phases in Ternary Alloy Systems of Transition Elements—P. A. Beck, University of Notre Dame; Sheldon Rideout and W. D. Manly, Oak Ridge National Laboratories; E. L. Kamen, U. S. Naval Reserve, and B. S. Lement, Massachusetts Institute of Technology.

Intermetallic Compounds in the System Molybdenum-Beryllium—S. G. Gordon and G. E. Klein, Los Alamos Scientific Laboratory; J. A. McGurty and W. J. Koshuba, NEPA Project.

Chromium-Nickel Phase Diagram—S. Bloom and N. J. Grant, Massachusetts Institute of Technology.

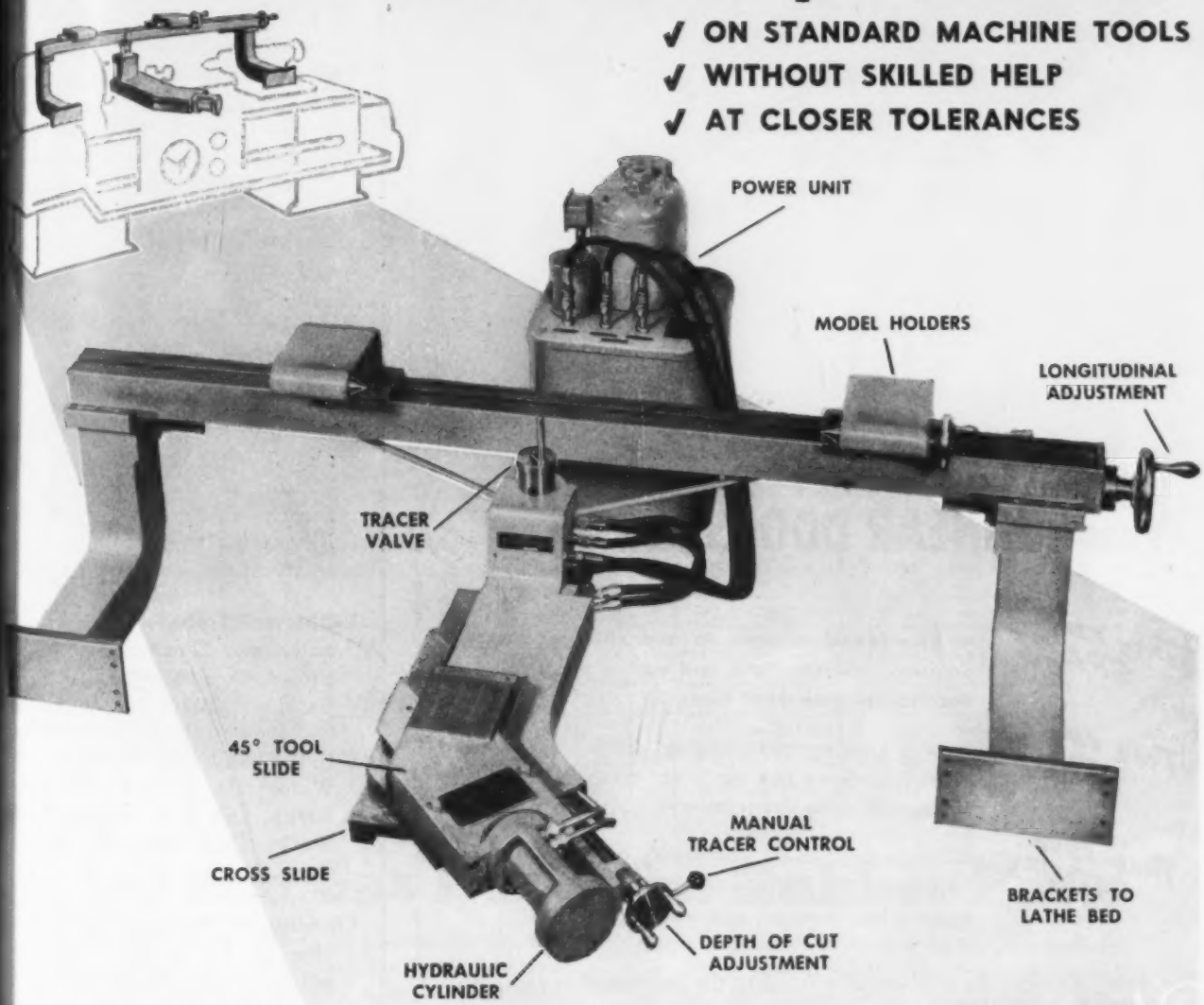
Effect of Tungsten or Molybdenum Upon the Alpha-Beta Trans-



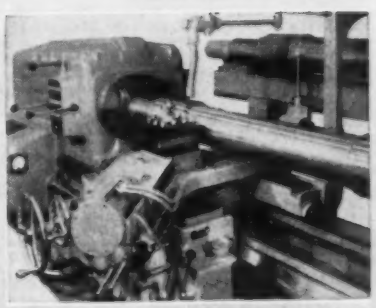
A few of thousands of Turchan-turned jobs show the wide variety of work handled.

Get 4 to 6 times faster production

- ✓ ON STANDARD MACHINE TOOLS
- ✓ WITHOUT SKILLED HELP
- ✓ AT CLOSER TOLERANCES



The Turchan Follower Attachment is a hydraulic duplicator that replaces the regular cross slide, operating at a 45° angle to the work axis. The cutting tool takes uninterrupted cuts and reproduces the model to tolerances of .001". Jobs such as motor shafts, spindles, valve stems, back shafts, piston rods, axles—in fact, any shaft regardless of length, number of steps, tapers and radii is ideally produced on Turchan equipped lathes. Hydraulic duplicator attachments increase the versatility of your present machines, and eliminate the need for special form tools. There are also Turchan attachments for milling machines, planers, shapers and grinders. "Turn to Turchan to cut costs."



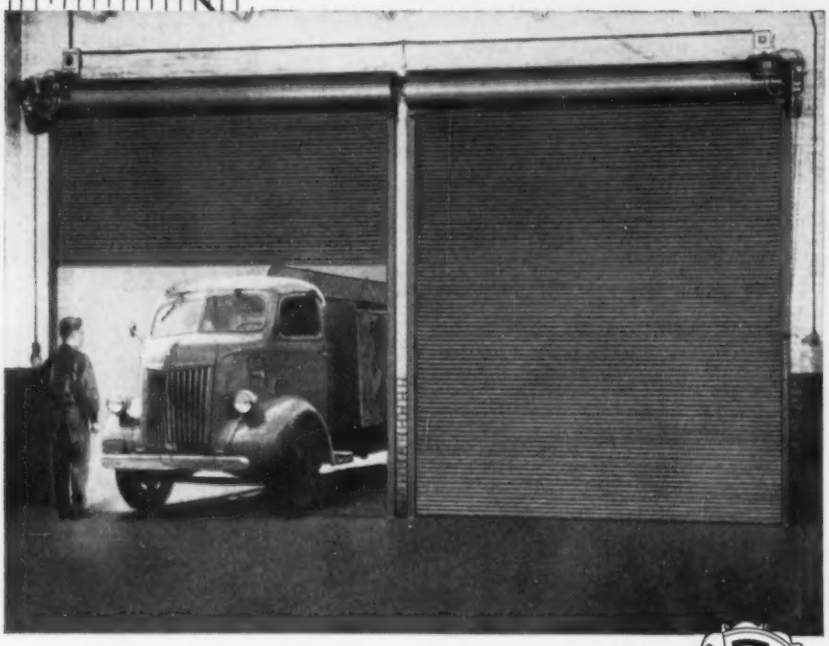
Turning a locomotive axle on a lathe equipped with the above Turchan duplicating attachment, in 2 hours instead of 8 hours.

WRITE US TODAY: Send a sketch and specification of any lathe job. Give make of machine. We'll show you how to produce it better, faster, at lower cost.

Turchan FOLLOWER MACHINE CO. 8259 LIVERNOIS AVENUE DETROIT 4, MICH.

OLDEST MANUFACTURER OF HYDRAULIC ATTACHMENTS FOR MACHINE TOOLS

COSTS ROLL DOWN



When KINNEAR DOORS Roll Up

They save SPACE — by opening straight up and coiling above the doorway, allowing floor and wall space around the door to be used at all times.

They save TIME — with smooth, easy gliding action. With motor operation, doors can be motor controlled from any number of conveniently located push-buttons.

They save MONEY — rugged, all-steel, interlocking slat curtain assures long life, low maintenance, and extra protection against fire, intrusion and wind damage.

Every Kinnear door is specially fitted to the individual opening, in old or new buildings. Cannot interfere with traffic or other plant activity. When opened, it stays neatly above lintel, out of reach of damage. The Kinnear door's capacity for years of hard, uninterrupted use under the most difficult conditions has been proved by a half century of service.

Let Us Send You The New Kinnear Data Book. Write For Your Copy Today.

The KINNEAR Manufacturing Co.
Factories: 1760-80 Fields Ave., Columbus 16, O.
1742 Yosemite Ave., San Francisco 24, Calif.
Offices and agents in all principal cities

Saving Ways in Doorways
KINNEAR ROLLING DOORS

—Program—

formation and Gamma Precipitation in Cobalt-Chromium Alloys—A. R. Elsea and E. R. Fletcher, Battelle Memorial Institute.

Afternoon

ASM—HIGH TEMPERATURE ALLOYS

Cast Heat Resistant Alloys of the 21 Pct Chromium-9 Pct Nickel Type—Howard S. Avery, Research Metallurgist, Charles R. Wilks, Metallurgist, and John A. Fellows, Research Metallurgist, American Brake Shoe Co., Mahwah, N. J.

Influence of Extended Time on Creep and Rupture Strength of 16-25-6 Alloy—C. L. Clark and M. Fleischmann, Metallurgical Engineers, Steel & Tube Division, Timken Roller Bearing Co., Canton, and J. W. Freeman, Research Engineer, Engineering Research Institute, University of Michigan, Ann Arbor, Mich.

Isothermal Transformation, Hardening and Tempering of 12 Pct Chromium Steel—R. L. Rickett, Research Laboratory, U. S. Steel Co., Kearny, N. J.; W. F. White, U. S. Steel Co., Pittsburgh; C. S. Walton, U. S. Steel Co., Pittsburgh, and J. C. Butler, South Works, U. S. Steel Co., S. Chicago, Ill.

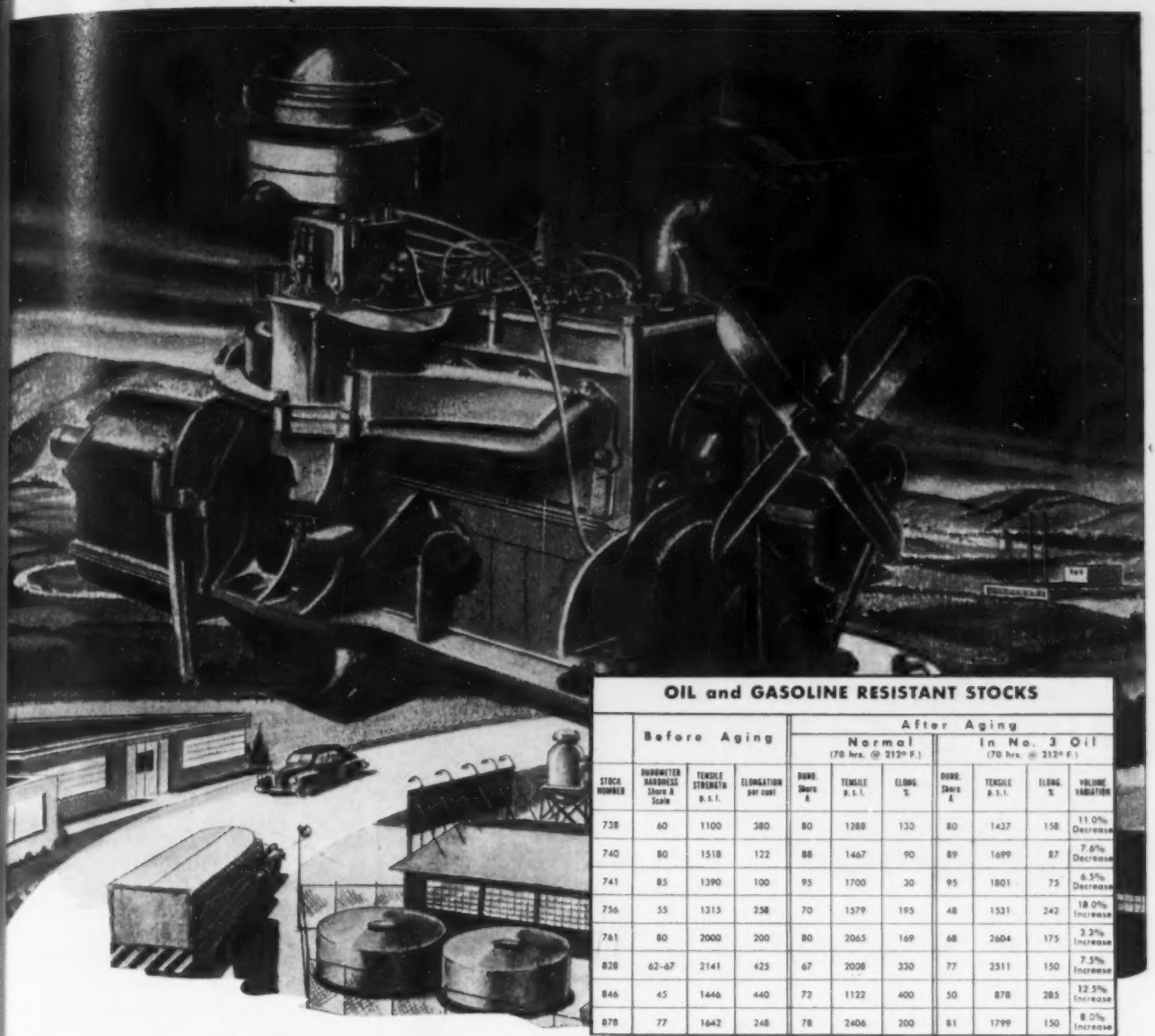
Cladding of Molybdenum for Service in Air at Elevated Temperature—W. L. Bruckart, Research Engineer, and R. I. Jaffee, Supervisor in Nonferrous Physical Metallurgy, Battelle Memorial Institute, Columbus, Ohio.

AWS—SHIP STRUCTURE

Welded Reinforcement of Openings in Structural Steel Plates—D. Vasarhelyi and R. A. Hechtman, University of Washington.

Evaluation of Welding Procedure by Direct Explosion Testing—G. S. Mikhalapov, Metallurgical Research and Development Co.

Investigation of Factors Which Determine Welded Performance



OIL and GASOLINE RESISTANT STOCKS

	Before Aging			After Aging						
				Normal (70 hrs. @ 212° F.)			In No. 3 Oil (70 hrs. @ 212° F.)			
STOCK NUMBER	DUROMETER HARDNESS Shore A Scale	TENSILE STRENGTH p.s.i.	ELONGATION per cent	DURO. Shore A	TENSILE p.s.i.	ELONG. %	DURO. Shore A	TENSILE p.s.i.	ELONG. %	VOLUME VARIATION
738	60	1100	380	80	1288	130	80	1437	158	11.0% Decrease
740	80	1518	122	88	1467	90	89	1699	87	7.6% Decrease
741	85	1390	100	95	1700	30	95	1801	75	6.5% Decrease
756	55	1315	258	70	1579	195	48	1531	242	18.0% Increase
761	80	2000	200	80	2065	169	68	2604	175	3.3% Increase
828	62-67	2141	425	67	2008	330	77	2511	150	7.5% Increase
846	45	1446	440	72	1122	400	50	878	285	12.5% Increase
878	77	1642	248	78	2406	200	81	1799	150	8.0% Increase

Oil and Gas Resistant Rubber Parts

Engineered to withstand petroleum products and their derivatives, rubber parts produced by STALWART are daily specified for applications in aircraft, automobiles, trucks, ships and railroad rolling stock.

STALWART can fabricate oil and gasoline resistant rubber parts having tensile strengths up to 2600 pounds p.s.i., durometer hardness from 45 to 95, and elongation ranging from 122 to 400 percent. In addition, these same stocks can be compounded to afford excellent resistance to weathering, abrasion, and temperatures (low and high).

STALWART can furnish precision-made rubber parts in production quantities to meet individual, S.A.E. and A.S.T.M. specifications as well as the SB specifications under MIL-R-3065 (superseding ARMY 20-116A)

The urgency of maintaining continuous operation of both transportation and industrial facilities is becoming increasingly important, and STALWART is keeping pace with demands made upon rubber parts by developing better and longer lasting compounds.

Write today for the new 16-page, illustrated and multicolored catalog Number 51SR-1 for additional details.

151-SR

STALWART RUBBER COMPANY

10164 NORTHFIELD ROAD • BEDFORD, OHIO

-complete automatic
finishing system
for small metal parts!
• WASH
• PHOSPHATIZE
• RINSE
• DRY
• PAINT
• BAKE
at Ypsilanti Plant
FORD MOTOR COMPANY
Hailed as the answer to a multitude of problems encountered in baked enamel finishing of small metal parts is this system designed and engineered by CINCINNATI Cleaning and Finishing Machinery Co. In a single, continuous operation parts are cleaned, dried, and dip-painted . . . in an automatic machine . . . in a space just 24 feet by 15 feet.
Easily adaptable to an almost limitless variety of small parts, this particular installation is in the Ford Motor Company plant at Ypsilanti, Michigan. Generator regulator covers are completely finished at the rate of 1440 parts per hour . . . one every three seconds!
Your particular cleaning and finishing problem may involve a larger or smaller quantity of big or little parts but whatever it is, let CINCINNATI engineers suggest a money-saving solution. Typical installations show savings ranging to 75% on time and cost. New catalog available. Write for your copy.
Cincinnati
CLEANING AND FINISHING MACHINERY COMPANY
313 HECLA STREET IRONTON, OHIO

Program

—C. Hartbower and W. S. Pellini, Naval Research Lab.

Upper and Lower Transition in Charpy Tests—W. J. Harris, Jr., J. A. Rinebolt and R. Haring, Naval Research Lab.

AWS—HARD FACING AND FLAME HARDENING

Control of Rail-End Hardening—La Motte Grover, Air Reduction Sales Co.

Hard Facing for Impact—Howard S. Avery, American Brake Shoe Co.

Development of Fused Metallized Coatings—Harrison S. Sayre, U. S. Naval Engineering Experiment Station.

AWS—RESISTANCE WELDING

Trends in Electronic Nonsynchronous Resistance Welding Controls—Stuart C. Rockafellow, Robatron Corp.

Flash Welding of Components for Aircraft and Similar Applications—J. H. Cooper, The Taylor-Winfield Corp.

Fatigue Strength of Spot-Welded Light Alloy Joints—H. Kihara, President, The Japan Welding Society.

SNT

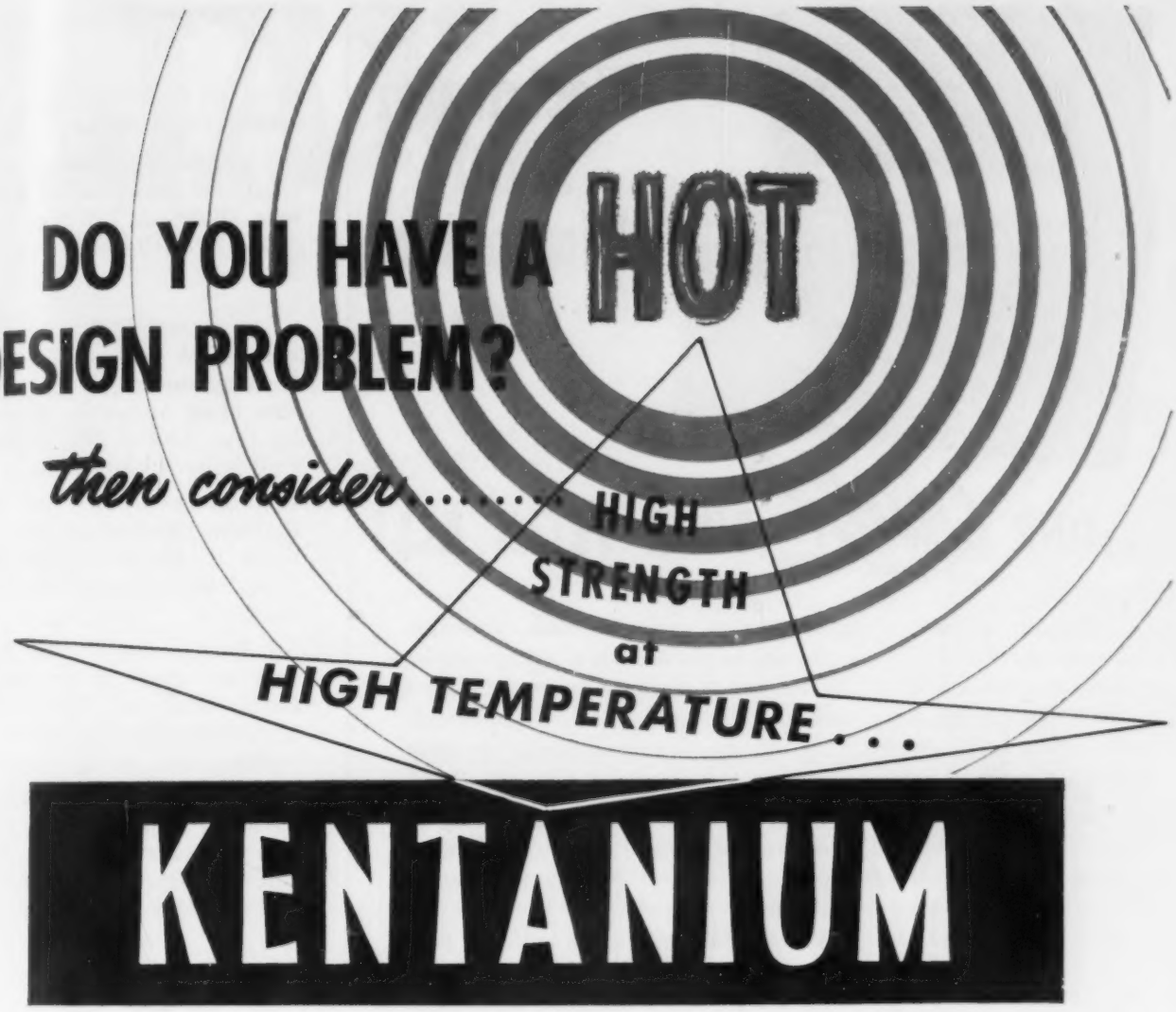
Radiographic Inspection (including data on the latest developments in "TV" and "Crystal" pick up and presentation of X-Ray images).

AIME—LIGHT METALS

Effects of Pre-Compression on the Behavior of the Aluminum Alloy 24ST During Cyclic Direct Stressing—S. I. Liu, Pei-Yank University.

Structure Studies of Plastic Deformation in Aluminum Single Crystals—N. K. Chen, Johns Hopkins University, and C. H. Mathewson, Yale University.

Effect of Alloying Elements on the Elevated Temperature Plastic Properties of Alpha Solids Solutions of Aluminum—J. E.



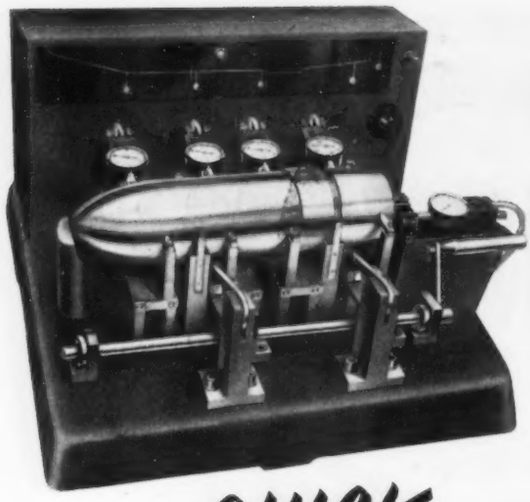
You can really put the heat on this material! It's new. It's distinctive—in properties and performance. It withstands high temperature punishment that quickly weakens and disintegrates conventional heat-resistant materials. It goes through a "fiery furnace" and comes out practically "unscaled" . . . resists oxidation up to 2200°F over long periods, and up to 4500°F for short exposures. Shows no weakening when subjected to the thermal shock of alternate heating and cooling from 1800°F to 180°F in one minute cycles for 100 hours continuously while under tensile stress of 12,500 p.s.i. Superior to best currently-used alloys in stress rupture characteristics from 1500°F up. Much lighter than steels or conventional alloys—a property especially valuable for rotating parts.

KENTANIUM CONTAINS NO TUNGSTEN OR COBALT

Kentanium — our own exclusive development — is chiefly titanium carbide (small percentages of other refractory metal carbides) with nickel "binder." *Uses neither tungsten nor cobalt.* Can be had in various sintered forms—extruded rods, tubes, squares, and flats—simple molded shapes—or more intricate forms that are machined from pressed powder slugs. Not heat-treatable . . . can be worked after sintering only by grinding, to produce required dimensional tolerance or surface finish. Several "grades" are available, with properties to meet specific combinations of imposed conditions.

☆ *If you're sweating over a hot design problem that has you stopped cold, perhaps Kentanium can come to your rescue with possibilities for providing longer life and greater efficiency. We invite your inquiries. Our engineers will be glad to work with you in determining the applicability of Kentanium to your design projects.*

See our demonstrations of KENTANIUM at the A. S. M. Show, Detroit • SPACE G-252



Electricator Multi-Dimension Gage

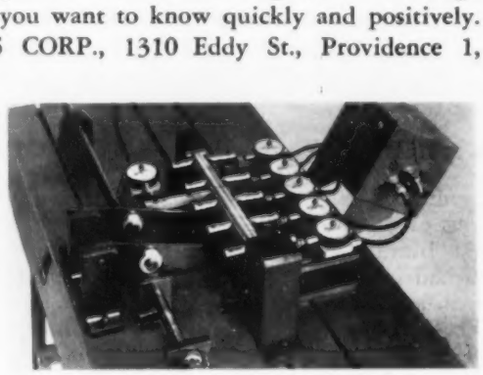
...ONE *QUICK* LOOK TELLS ALL!

Whether it's shells or shafts, fuses or jet engine blades—whether it's two, or twelve, or more dimensions you can tell at a single glance if all are within tolerance or not; for diameter or concentricity, and for length or any other dimension. You can also find out quickly *how much* any dimension is "off" so you can save and classify oversize pieces for reworking.

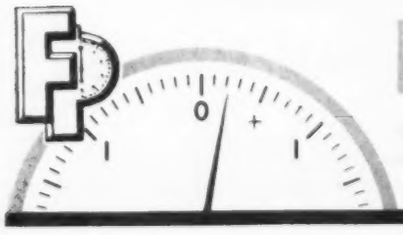
This is possible because the Federal-Electricator units which gage each dimension combine the advantage of the Dial Indicator graduations with electrical tolerance contacts. If any dimension is wrong its identity is immediately flashed on the light panel. The Dial Indicator graduations also make it easy to set the Gage to size limits. A pilot light tells you at all times that the Gage is in working condition.

Anything from small pieces to large can be gaged. Some Electricator Multi-Dimension Gages are made adjustable for various sizes (see photo below). Large pieces are lifted in or out by either hand or foot-operated lifting arms as shown in illustrations.

Tell us about your requirements, and let us figure out the Gage that will tell you what you want to know quickly and positively. FEDERAL PRODUCTS CORP., 1310 Eddy St., Providence 1, Rhode Island.



This Electricator Gage is adjustable for workpieces of various diameters and lengths. Notice a single monitor light signals when any dimension is "off".



FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing all types of DIMENSIONAL INDICATING GAGES.

—Program—

Dorn, O. D. Sherby, R. A. Anderson, University of California.

Effect of Alloying Elements on the Electrical Resistivity of Aluminum Alloys—A. T. Robinson and J. E. Dorn, University of California.

AIME—CREEP

Fundamental Effects of Cold Working on the Creep Resistance of an Austenitic Alloy—D. N. Frey and J. W. Freeman, University of Michigan.

Creep Characteristics of Some Platinum Metals at 1380°F—Ralph H. Atkinson, D. R. Furman, International Nickel Company.

Creep Behavior of Zinc as Modified by Copper in the Surface Layer—Earl R. Parker and M. R. Pickus, University of California.

Creep and Stress Rupture Behavior of Aluminum as a Function of Purity—Italo S. Servi and N. J. Grant, Massachusetts Institute of Technology.

Evening

AWS—ADAMS LECTURE

AIME—INSTITUTE OF METALS DIVISION FALL DINNER

Wednesday, Oct. 17

Morning

ASM ANNUAL MEETING

Edward DeMille Campbell Memorial Lecture.

AWS—PRODUCTION WELDING

Welding Heat Exchanger for the Chemical Industry—John W. Mortimer, Professional Engineer.

Product Design for Welding—John Mikulak, Worthington Pump and Machinery Corp.

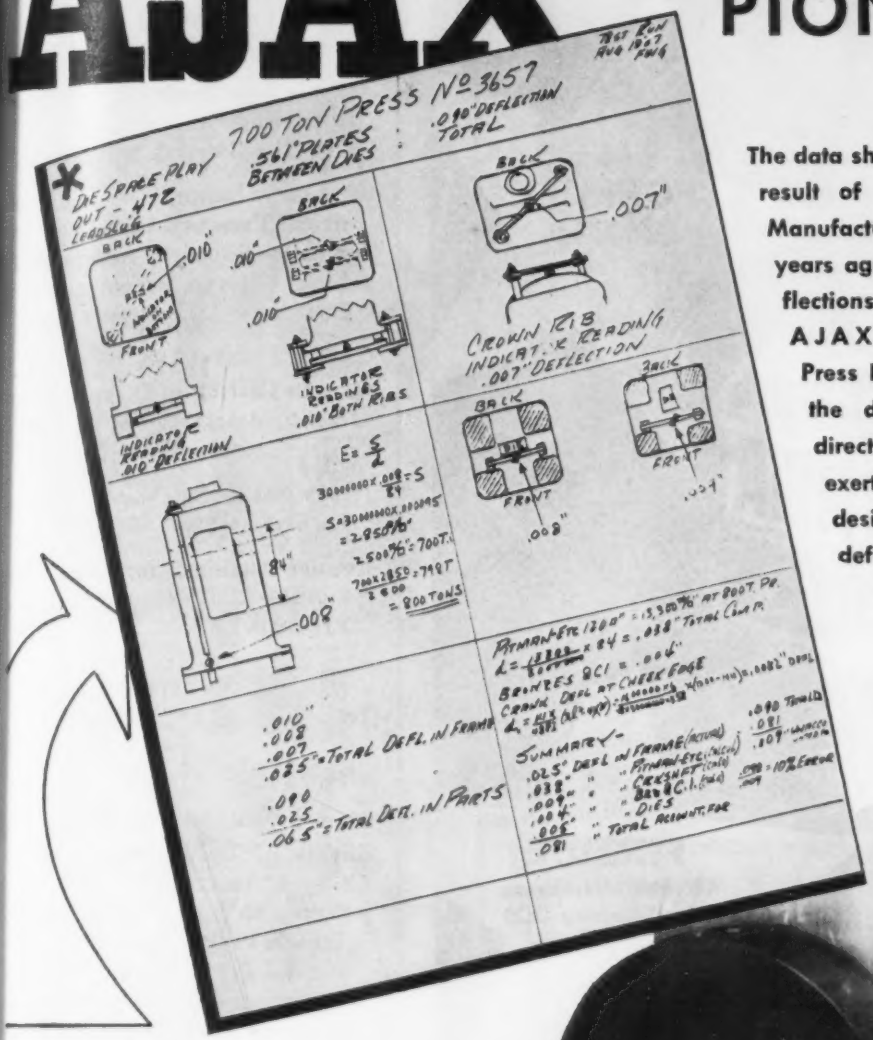
Welding Fixtures for Use with Submerged Arc—J. P. Berkeley, Berkeley Equipment Co.

AWS—PRESSURE VESSELS

Effect of Fabrication Processes on Steel Used in Pressure Vessels—Dr. S. S. Tor, J. M. Ruzek, Dr.

AJAX

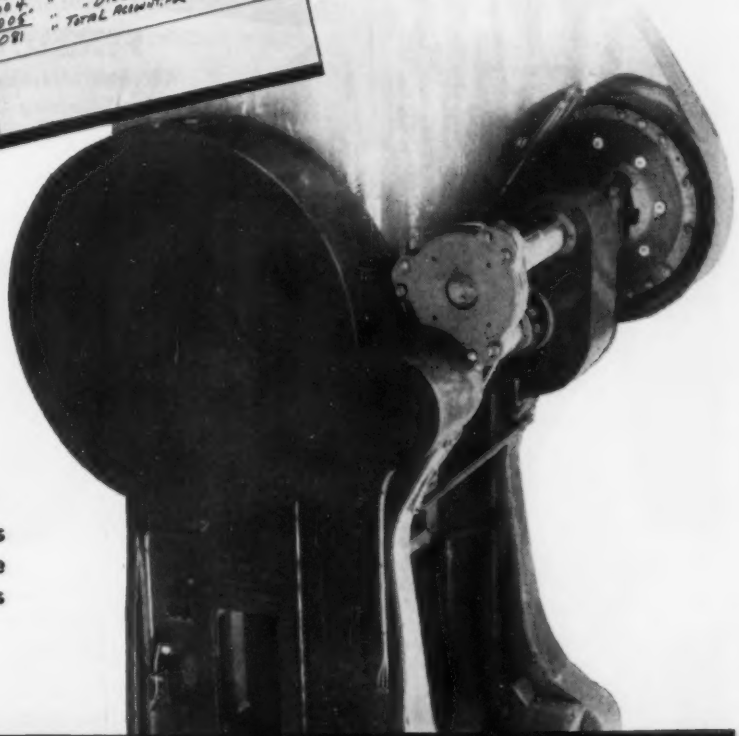
ENGINEERING PIONEERING



The data sheet on the left shows the original result of a test performed at the Ajax Manufacturing Co. plant in 1937, fourteen years ago. Here are the readings of deflections at different locations on an AJAX seven-hundred ton Forging Press Frame. This method of reading the deflections of a Press Frame directly to determine the tonnage exerted, enabled our engineers to design frames for a minimum deflection at critical locations.

Illustrated Below

2000 ton AJAX Solid Frame Forging Press Equipped with Disc Brake, Built in 1937



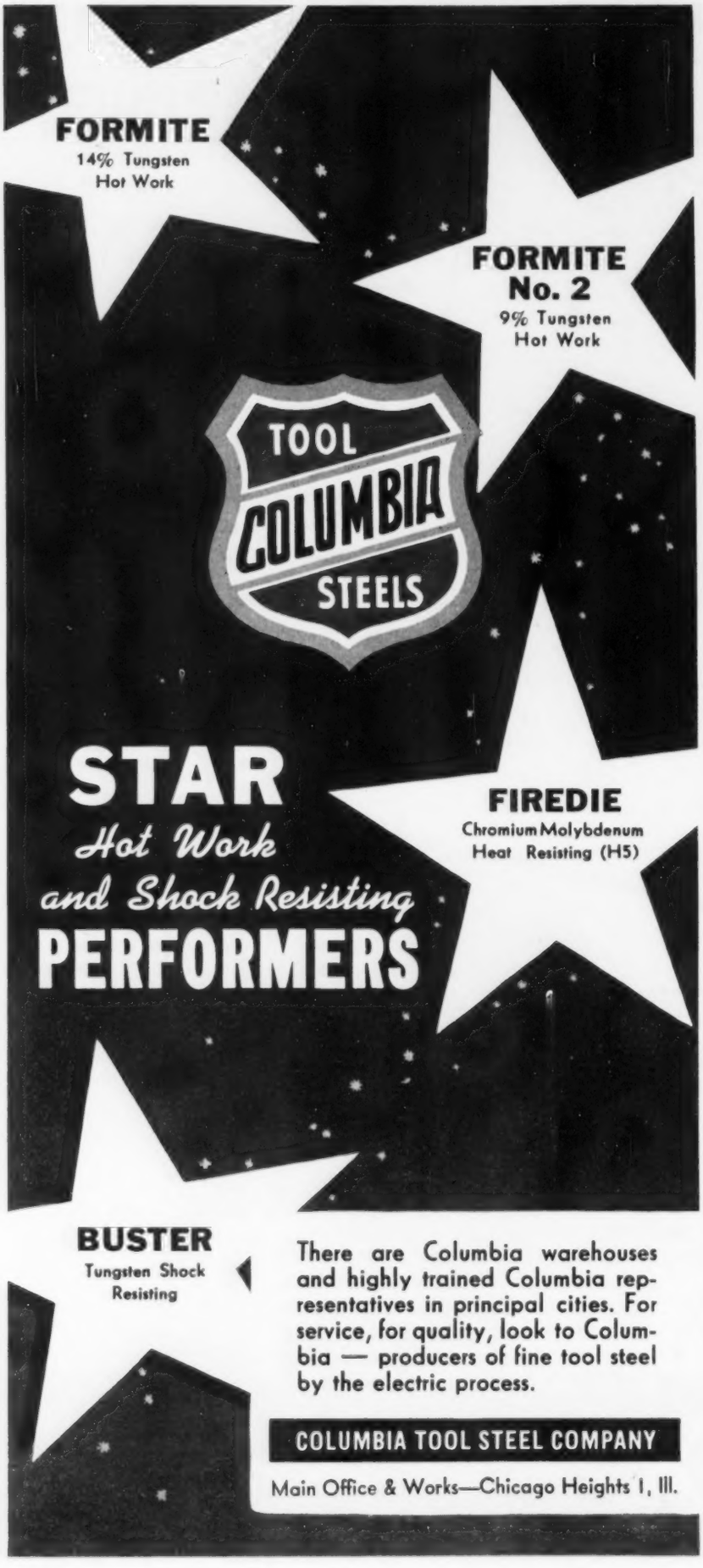
This old sketch of a press frame shows the use of a dial indicator and guage rod to read the elongation of the frame under load, which is a direct function of the tonnage exerted.

Fourteen Years Ago . . .

A two-thousand ton Ajax Forging Press equipped with a disc brake, believed to be the first of its type, used on a Forging Press

Built by **AJAX**

THE Ajax MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND 17, OHIO
110 S. DEARBORN ST. CHICAGO 3, ILLINOIS
DEWART BUILDING NEW LONDON, CONN.



Program

R. Stout, Lehigh University, Fritz Engineering Lab.

Biaxial Fatigue Tests on Flat Plate Specimens—R. U. Blaser, L. F. Kooistra and J. T. Tucker, Jr., The Babcock & Wilcox Co.

Stresses in Large Horizontal Cylindrical Pressure Vessels on Two Saddle Supports — Leonard P. Zick, Chicago Bridge and Iron Co.

AWS—GAS CUTTING

Oxygen Cutting of Defense Equipment Materials—A. H. Yoch, Air Reduction Sales Co.

Heavy Scrap Cutting—L. P. Elly, Bethlehem Steel Co.

Powder-Washing for Metal Removal—R. S. Babcock, Linde Air Products Co.

SNT—SYMPOSIUM

Testing of Jet Engine Parts.

Afternoon

ASM—EMBRITTLEMENT

Effects of Decomposition of Retained Austenite During Tempering on Notch Toughness and Tensile Properties—E. F. Bailey and W. J. Harris, Jr., Members of Ferrous Alloys Branch, Naval Research Laboratory, Washington, D. C.

Comparison of the Effects of Alloying Elements on the Lower and Upper Transition Temperatures in Pearlitic Steel—J. A. Rinebolt and W. J. Harris, Jr., Ferrous Alloys Branch, Naval Research Laboratory, Washington, D. C.

Effect of Retained Austenite Upon Mechanical Properties—L. S. Castleman, Atomic Power Div., Westinghouse Electric Corp., Pittsburgh; B. L. Averbach, Assistant Professor of Physical Metallurgy, and Morris Cohen, Professor of Physical Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

Some X-Ray Diffraction and Electron - Microscope Observations on Temper-Brittle Steels—S. R.

SPUN

UPSET

SWAGED and EXPANDED

BENT

FORMED

let's take a CLOSER LOOK at Fabrication Requirements

If you make hollow parts the economical way—from tubing—chances are you have one or more fabricating problems. This typical array of parts illustrates the wide range in severity of working that is involved in such operations as spinning, swaging, expanding, upsetting, bending, and forming. A corresponding diversity exists in the type, grade, finish, and mill condition of seamless and welded steel tubing used for their manufacture.

Remember, tubing is more than bar stock with a hole in it. It is a semi-finished product. B&W's ability to match its tubing to a myriad of end uses may enable you to make a better product . . . easier. Ask Mr. Tubes—your B&W Tube Company Representative—for help in selecting the tubing that is best for *your* fabricating requirements. Request a copy of Bulletin TB-324. TA-1641-M

THE BABCOCK & WILCOX TUBE COMPANY

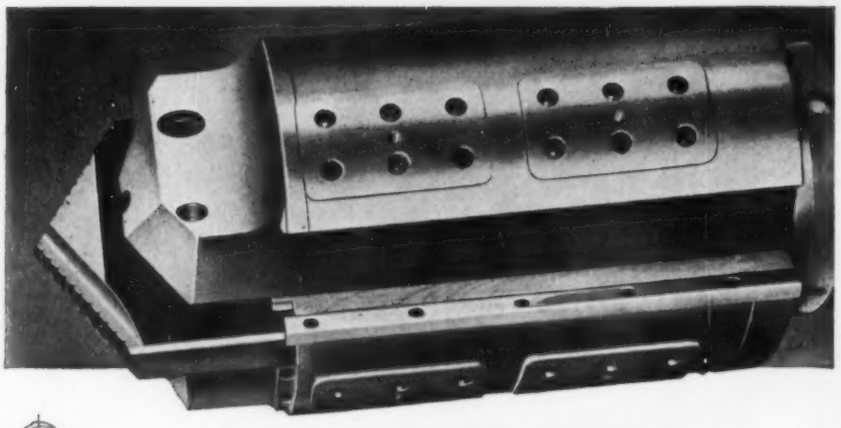
***Executive Offices:* Beaver Falls, Pa.**

General Offices & Plants

Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing

Alliance, Ohio—Welded Carbon Steel Tubing

Sales Offices: Beaver Falls, Pa. • Boston 16, Mass. • Chicago 3, Ill. • Cleveland 14, Ohio
Denver 1, Colo. • Detroit 26, Mich. • Houston 2, Texas • Los Angeles 17, Calif. • New York 16, N.Y.
Philadelphia 2, Pa. • St. Louis 1, Mo. • San Francisco 3, Calif. • Syracuse 2, N.Y.
Toronto, Ontario • Tulsa 3, Okla.



DEEP HOLE TOOLING

Maybe your product calls for a ten-inch hole. That's a *large* hole. Or maybe it's just three inches, but five feet deep . . . that's both a *large* hole and a *deep* hole. Or a 3/16 hole, running the length of a rifle barrel . . . not large, but very *deep*.

Those are difficult holes to drill; from the solid that is, in one continuous operation . . . especially in today's tough and hard alloys, heat-treated before machining.

Indeed, the difficulties in what we generally call "deep hole drilling" increase three ways: with the diameter, with the depth, and with the hardness of the material.

Drilling and boring holes like these requires specialized engineering, including the selection of the right machines and equipment, and tool design backed by long experience.

This experience is not just under our hats. It's on paper, in carefully kept records, and it's in glass jars, containing our collection of chips.

We keep our eyes on those chips, because we know that every tool we design must produce chips of carefully determined size and shape, so they can be flushed out of the hole without interruption.

Ample flow of coolant must be provided through the inside and along the outside of the tool to carry off the chips, yet, the necessarily long tool body must be strong enough to prevent torsional deflection which might cause chatter.

To strike the fine balance between these various factors has been daily work at CONNER's for so long, that CONNER tool designs never fail to give calculated results, providing they're put to work as recommended.

So, if your products call for deep holes, come to us. We don't know what your problem may be, but, in most cases, we have been able to provide tools of such design that the first pieces produced passed inspection.

CONNER also offers its services:
- **as Consultants, to devise production methods**
- **as Toolmakers, to supply standard and special tools**
- **as Drillers, to do deep hole work for you.**

Conner
TOOL & CUTTER CO.
C|C

Deep Holes Exclusively

1000 East McNichols Road, Detroit 3, Michigan

—Program—

Maloof, Research Metallurgist, Springfield Armory, Springfield, Mass.

AWS—WELDABILITY

The Relation of Notch Strains to Bend Angles in the Notched-Bend Test—Prof. A. E. Flanigan, University of California, and Ernest M. Emery, North American Aviation Co.

Repeated Load Tests on Welded and Prestrained Steel—Dr. S. S. Tor, J. M. Ruzek, Dr. R. D. Stout, Lehigh University, Fritz Engineering Laboratory.

The Micro-Mechanism of Fracture in the Tension-Impact Test—W. H. Bruckner, University of Illinois.

AWS—WELDING AND BRAZING

Nested Electrodes for Metal Arc Welding—W. A. Snyder, University of Washington.

Welding Steel Mill Maintenance During Defense Period—R. L. Deily, Air Reduction Sales Co.

Dilution and Diffusion Aspects of Brazing—R. D. Wasserman and Joseph F. Quaas, Eutectic Welding Alloys Corp.

AWS—STAINLESS STEELS

Welding of High-Alloy Steel Castings—R. D. Thomas, Jr., Chairman of WRC Committee on the subject.

The Structural Stability of Welded Joints Between Dissimilar Metals in High-Temperature Service—R. W. Emerson, Pittsburgh Piping & Equipment Co.

SNT—SYMPOSIUM

Testing of Ordnance Material

AIME—HIGH TEMPERATURE OXIDATION OF METALS AND ALLOYS

Oxidation of Titanium—M. H. Davies and C. E. Birchenall, Carnegie Institute of Technology.

Thermal Stability of the Chromium, Iron and Tungsten Borides in Steaming Ammonia and the Existence of a New Tungsten Nitride—Roland Kiessling

...with

STAR BLADES

For cutting time while cutting metal, nothing has ever beaten STAR hacksaw blades, frames, and metal-cutting band saw blades.

Tell your supplier you want STAR – the blades most people buy.

Sold only through recognized distributors

CLEMSON BROS., Inc.
MIDDLETOWN, N.Y., U.S.A.
Makers of Hand and Power Hack Saw Blades, Frames, Metal Cutting Band Saw Blades and Clemson Lawn Machines

1082A

—**Program**—

and Y. H. Liu, University of Uppsala, Sweden.

High Temperature Oxidation of Copper-Palladium and Copper-Platinum Alloys—D. E. Thomas, Westinghouse Electric Corp.

Mechanism and Kenetics of the Scaling of Iron—M. H. Davies, M. Y. Simnad, and C. E. Birchenall, Carnegie Institute of Technology.

Thermal Variation of Young's Modulus in Some Fe-Ni-Mo Alloys—Morris E. Fine and W. C. Ellis, Bell Telephone Laboratories.

Evening

AIME—POWDER METALLURGY

Role of Gases in the Production of High Density Powder Compacts—Donald Warren and J. F. Libsch, Lehigh University.

Solubility Relationships in Some of the Ternary Systems of Refractory Mono-Carbides—John T. Norton, Massachusetts Institute of Technology and A. L. Mowry, Kaiser Aluminum and Chemical Company.

Thursday, Oct. 18

Morning

ASM—MECHANICAL METALLURGY

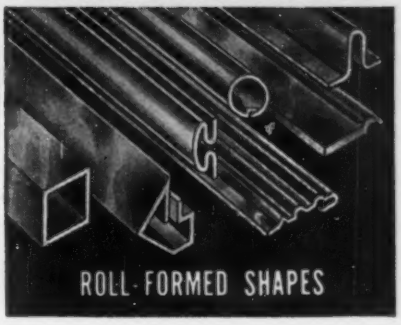
Strain Aging Effects—J. D. Lubahn, Metallurgy and Ceramics Divs., General Electric Co., Research Laboratory, Schenectady, N. Y.

Fatigue Strength of Large, Notched Steel Bars Surface Hardened by Gas Heating and by Induction Heating—S. L. Case, J. M. Berry and H. J. Grover, Battelle Memorial Institute, Columbus, O.

Deep Drawing Limits for Rectangular Boxes—T. Ishikawa, Osaka, Japan.

Elimination of Yield Point Phenomena by Temper Rolling and Roller Leveling—N. H. Polakowski, Swansea, England.

Effect of High Heating Rate on the Tensile Properties of Metals—W. K. Smith, Metallurgist, C. C. Woolsey, Metallurgist, and



Let Werner light metal shapes help you meet "D.O." deadlines.

You can get prompt delivery of "custom" shapes in extruded aluminum, as well as roll-formed aluminum, stainless steel, brass, zinc and copper. Shapes are manufactured to close tolerances, to your exact specifications. Quality is assured by Werner's extensive manufacturing and engineering experience, plus full production facilities, including tool-and-die-making equipment.

For an estimate, send drawing and specifications, plus data on quantity, finish, length, etc. Werner can perform the following secondary operations—bending, drilling, punching, cutting, counter sinking and welding. Finishes—as extruded, polished or anodized.

R. D. WERNER CO., INC.
295 FIFTH AVE., N. Y. 16, N. Y. • PHONE MU 6-2595
MANUFACTURERS OF ALUMINUM EXTRUSIONS AND ROLL-FORMED SHAPES

Send to:
R. D. WERNER CO., Inc., Dept. IA
295 Fifth Ave., New York 16, N. Y.
FREE bulletins describing manufacturing facilities and telling when to choose extruded or rolled shapes.

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

ARMSTRONG *Drop Forged* LATHE DOGS

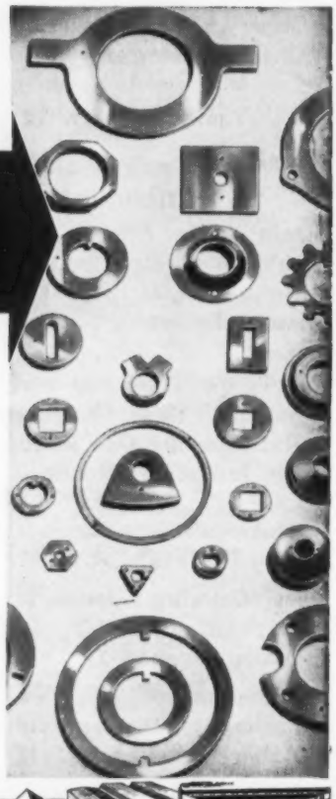
ARMSTRONG Lathe Dogs give extra service because they are drop forged from selected open hearth steel, and are heat treated to extreme toughness and stiffness. Hubs are made large enough to permit re-tapping, screws are also of special analysis steel and are hardened at the point to prevent upsetting. ARMSTRONG Dogs come in 10 types with square head or safety headless screws, with straight or bent tails. They are carried in stock by your local ARMSTRONG Distributor.

Write for Catalog

ARMSTRONG BROS. TOOL CO.
5209 West Armstrong Ave., Chicago 30, Ill.
New York and San Francisco

Since 1887

MILWAUKEE WROT WASHERS



***Better* WASHERS . . . Competitively Priced**

Large volume production, the most advanced methods and facilities, plus more than 60 years of continuous experience in the manufacture of Washers, are factors that enable us to offer you top quality washers and stampings at competitive costs. Over 22,000 sets of dies for making Washers of every type (Standard and Special), from every type of material, for every purpose, in any finish. STAMPINGS of all descriptions; Blanking, Forming, Drawing. *Submit your blueprints and quantity requirements for estimates.*

WROUGHT WASHER MANUFACTURING CO.
The World's Largest Producer of Washers
2202 S. BAY ST., MILWAUKEE 7, WIS.

—Program—

W. O. Wetmore, Head Metallurgy Branch, U. S. Naval Ordnance Test Station, China Lake, Calif.

ASM—HIGH TEMPERATURE PHASES

An Interpretation of the Hysteresis Loops in A_3 and A_4 Transformations of Pure Iron—K. Honda and M. Sato, Tokyo, Japan.

Magnetic Property Changes in Iron Molybdenum Alloys During Aging—T. Mishima, R. Hasizime and Y. Kamura, Tokyo, Japan.

Age Hardening—T. Mishima, Tokyo, Japan.

Carbide Reactions in High Temperature Alloys—J. R. Lane, Naval Research Laboratory, Washington, D. C., and N. J. Grant, Associate Professor of Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

The Allotropy of Cobalt—A. G. Metcalfe, Delford, Ontario, Canada.

AWS—EDUCATIONAL

Selecting and Training Welding Operators for the Defense Program—A. N. Kugler, Air Reduction Sales Co.

Metallurgy for the Welding Student—J. D. Paterson, Cass Technical High School.

Tentative Standards for School Welding Shops—Carl H. Turnquist, Cass Technical High School.

Welding Instruction in the Public Schools—A. D. Althouse, Detroit Public Schools.

AWS—WELDABILITY

The Arc Welding of Carbon-Molybdenum Steel Pipes—F. J. Winsor, E. I. du Pont de Nemours and Co.

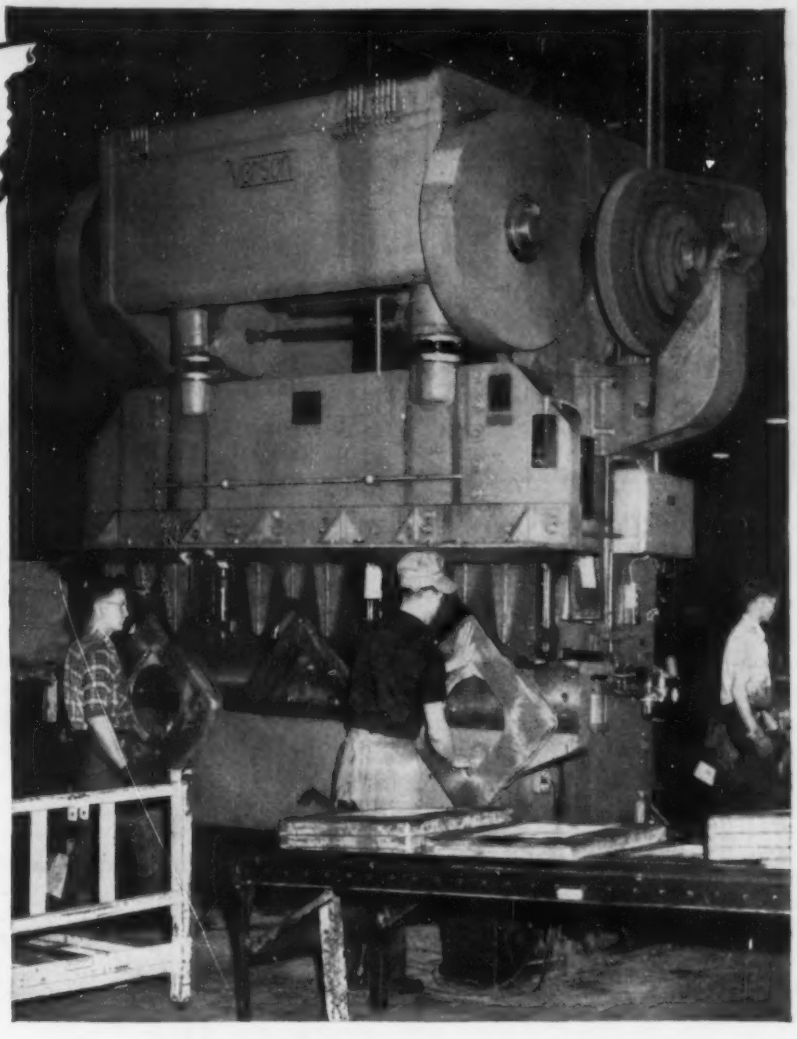
Residual Stresses Due to Circumferential Welds in Seamless Mild Steel Pipe—L. J. Privoznik, Standard Oil Co. (Ind.)

Heat Treating Properties of Low-Hydrogen Electrode Weld Metal

Can you match these production figures?

THIS TRADE Verson MARK PRESS BRAKE TOOL-UP

return flanges 200 washer covers per hour



In modern metal forming procedures, the press brake has become a "Jack-of-all-trades" and a very good one at that. Take the job illustrated above—tops of Maytag automatic washers are return flanged on a Verson Major Press Brake with Verson Tooling—and on a production basis. Yet, as well as the press brake performs on the more complicated jobs, it is equally adaptable to simple bending with runs of just a few pieces.

If you have a forming, bending, coping, notching or punching job, it will pay to consider a Verson Press Brake Tool-Up. There is a Verson Press Brake for every need from 48″ of 16 ga. steel up to long lengths of heavy plate. Both mechanical or hydraulic types are available. Verson Press Brake Tooling can be furnished for virtually every shape from a simple 90° angle to the most intricate multi-operation formed sections.

Descriptive literature giving design details and specifications is available. Write for your copy outlining the nature of your problem. Practical, experienced Verson engineering assistance is also available to help you in the selection of the right equipment for your job.

Originators and Pioneers of Allsteel Stamping Press Construction

VERSON ALLSTEEL PRESS COMPANY

9314 Kenwood Avenue, Chicago 19, Illinois — Holmes Street and Ledbetter Drive, Dallas 8, Texas

A VERSON PRESS FOR EVERY JOB FROM 60 TONS UP!

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING
DIE CUSHIONS • COMPRESSION AND TRANSFER MOLDING PRESSES

Why You Get Longer Service Life From

PYROFLEX EQUIPMENT

The workmen above are heat-bonding PYROFLEX thermoplastic corrosion-proof sheet lining to the steel shell of a pickling tank. The mason (below) is setting the first of two courses of acid-proof brick in KNIGHT acid-proof cement over the sheet lining. The finished unit will be fully corrosion-proof to any type or combination of corrosives for which it was designed.

Many different types of linings and construction are used in PYROFLEX Constructed Units depending on type of service. Each unit is designed to meet the needs of the individual situation. PYROFLEX Constructions include:

Acid Tanks
Fume Ducts
Brick Floors
Rinse Tanks
Acid Sewers
Plating Tanks
Pickling Tanks
Fume Scrubbers
Neutralizing Basins

Write for Bulletin No. 2T — PYROFLEX Construction.

MAURICE A. KNIGHT
310 Kelly Ave., Akron 9, Ohio
Acid and Alkali-proof Chemical Equipment

—Program—

—D. C. Smith and W. G. Rinehart, Harnischfeger Corp.

High-Temperature Welded Joints —R. H. English, National Alloy Steel Co.

AWS—INERT-ARC WELDING

Inert Gas Shielded Metal Arc Welding of Magnesium — Paul Klain, Dow Chemical Co.

Aircomatic Welding of Ferrous Metals—E. DiLiberti, Air Reduction Co.

Metal Transfer in Shielded Inert Gas Metal Arc Welding—R. T. Breymeier, Union Carbide and Carbon Research Lab.

High-Speed Consumable Electrode Machine Welding for Aircraft—Bernard Gross and R. A. Smith, Rohr Aircraft Corporation.

SNT

Statistical Quality Control Employing Non-Destructive Testing Methods.

Uses of NDT Methods in Industrial Metallurgy.

NDT Personnel Selection, Training and Rating

Fast X-Ray Film Processing.

Afternoon

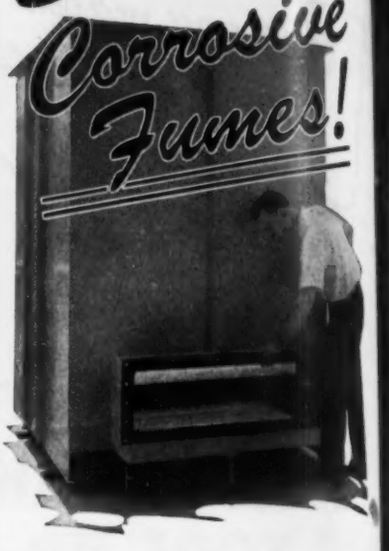
ASM—HEAT TREATMENT

Stress-Induced Transformation of Retained Austenite in Hardened Steel—B. L. Averbach, S. G. Lorris and Morris Cohen, Department of Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

An Investigation of the Quenching Characteristics of a Salt Bath—M. J. Sinnott, Associate Professor of Chemical and Metallurgical Engineering, and J. C. Shyne, Graduate Student, Department of Metallurgical Engineering, University of Michigan, Ann Arbor, Mich.

Limitations of the End Quench Hardenability Test—A. R. Troiano, Professor of Physical Metallurgy, and L. J. Klingler, Senior Research Associate, Case Institute of Technology, Cleveland.

Eliminate Corrosive Fumes!



Pyroflex-Constructed FUME WASHERS

Some of the gases scrubbed by these units contain the following:

Bromine
HCl
Sulphur Dioxide
Chlorine
Benzol and HCl
Sulphuric Acid
Sulphuric Acid and Dust
Muriatic Acid and Chlorine

Every Pyroflex-constructed Fume Washer is individually engineered for maximum efficiency. In each case Knight engineers consider individual requirements, limitations, water consumption and fan power, as well as service conditions. The result is an engineered functional unit "tailored" to meet specific requirements. These units utilize Berl Saddles to insure peak performance.

Although individually engineered, Knight Fume Washers are relatively low in cost and economical in operation.

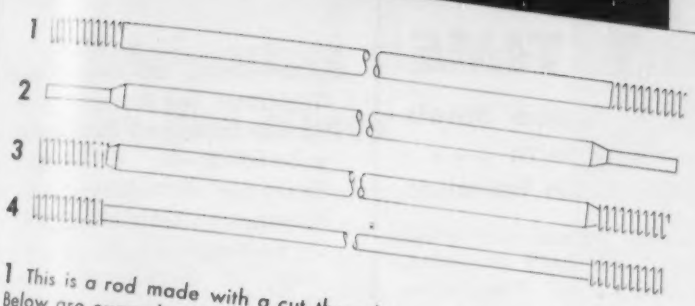
When writing for information, please include full details regarding service conditions.

Advantages

- **No moving parts.**
- **Turbulent gas flow, definite directional changes.**
- **Large useful surface area, no ledges or pockets.**
- **Low pressure drop, low power costs.**
- **Wide operating range.**
- **No temperature limitations.**
- **Simple to operate, low maintenance.**
- **Self cleaning, does not plug easily.**
- **Corrosion resistant throughout.**
- **Wide range of shapes and capacities.**
- **Small floor space, low head room.**
- **Performance guaranteed.**

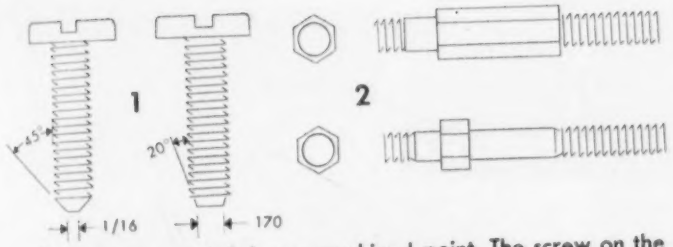
MAURICE A. KNIGHT
310 Kelly Ave., Akron 9, O.
Acid and Alkali-proof Chemical Equipment

Save Money



1 This is a rod made with a cut thread on each end of 1/4" wire. Below are examples of how same rod can be made for less money.
2 Shows rod of 1/4" wire with ends extruded ready for threads to be rolled.
3 Same rod as shown in Sketch #2 after threads have been rolled. Diameter of the threaded sections and unthreaded section are the same as shown in Sketch #1. The rolled threads are stronger than the cut threads.
4 Biggest saving would be made by using, in this case, a rod of .214/.216 diameter with threads rolled on each end. This would result in a savings of $30 per thousand over rod shown on Sketch #1. The tensile strength of the rod is determined by the thread, therefor the tensile strength of the rod is comparable to the other.

Save Time



1 The screw at left has a machined point. The screw on the right has a cold headed point which would save up to $4.00 per thousand. Note the slight difference in the taper of the point and diameter which in many applications would make little difference.
2 The top sketch shows a stud machined out of hex bar with resulting waste of steel and machine time. The bottom sketch shows a design which was upset and threaded, with considerable savings in steel and time resulting in a large saving to the customer.

Save Steel

1 Bolt has a machined point and cut threads. These operations are comparatively expensive.
2 The same bolt made with extruded end and rolled point. Diameter is reduced to permit thread to be rolled to same diameter as shank.
3 Completed bolt with rolled thread. Can be produced faster and at lower cost than bolt shown in Sketch #1.

HOW TO DESIGN SMALL PARTS

to save time — material

and as much as $30.00 per M

How a slight change in design saves time, material and reduces cost of small parts and fasteners is demonstrated by these examples. You may find that many such items you are using now in quantity could be redesigned to save you from $4.00 to $30.00 per thousand without impairing the efficiency of the part in any way. In fact, many parts are improved in strength by cold-heading. Also, the process is fast, lends itself to mass production and conserves critical material.

As specialists in cold heading, Townsend engineers help manufacturers in all industry reduce the cost and improve the efficiency of their parts and fasteners. They may be made of carbon steel, alloy steels, bronze, copper, monel and aluminum. These are supplied in a variety of platings and finishes. If you want to learn more about how you can improve your product and at the same time reduce costs send us a sample or sketch of the item and we will give you a suggestion.

Townsend

COMPANY · ESTABLISHED 1816

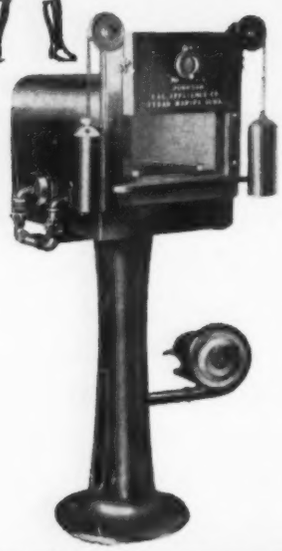
Plants—New Brighton, Pa. · Chicago 38, Ill.

Cherry Rivet Company Division, Los Angeles, California

Sales Offices in Principal Cities

STOP WASTING TIME

Heat Treat High Speed Steels in Your Own Plant with . . . . *Quick Acting* JOHNSON Furnaces



Save time, save gas . . . get the job done without delay with JOHNSON'S Hi-Speed No. 130A. Made in two temperature ranges. Four-burner unit for steels requiring 1400° to 2350° F. Six-burner for 1800° to 2400° F. Temperatures easily regulated with accuracy. Automatic controls available. Powerful burners fire under hearth assuring fast, uniform heat. Brazes carbide tool tips. Hardens small metal parts. Firebox 7" x 13" x 16½". Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower. Write for complete catalog. Johnson Gas Appliance Company 598 E Avenue, N. W., Cedar Rapids, Iowa.

JOHNSON No. 130A Hi-Speed

4-Burner $295.00
6-Burner $325.00

F. O. B. Factory
Also available in smaller sizes

JOHNSON

FURNACES FOR INDUSTRY

NOW Permanent Positive Marking with MARKAL PAINTSTIK

REAL PAINT IN STICK FORM

√ Impervious to Heat
√ Will not peel, fade or dry out
√ Handy as a Pencil

Mark with Markal Paintstiks—and be sure it **stays** marked. Use Paintstiks on any hot, cold, wet or dry surface—withstands heat to 2000°F.—cold to —50°F. and below. Stays on any surface. Preferred industry wide—there's **no** susbtitute for Markal Paintstiks!

Write for FREE Sample and Catalog describing the complete Paintstik line.

MARKAL COMPANY

3088 W. Carroll Ave., Chicago 12, Ill.

"There's no substitute for Markal Paintstik"

—Program—

A Correlation of End-Quenched Test Bars and Rounds in Terms of Hardness and Cooling Characteristics—E. W. Weinman, Research Metallurgist, R. W. Thompson, Assistant Head, and A. L. Boegehold, Head, Department of Metallurgy, General Motors Corporation, Research Laboratories Div., Detroit.

AWS—SYMPOSIUM

Filler Metal Specifications for Inert-Gas and Submerged-Arc Welding.

AWS—BUSINESS MEETING

Board of Directors Meeting

SMT—1951 LESTER LECTURE

Mr. Don M. McCutcheon
Ford Motor Company
11th Annual Business Meeting

Evening

AWS—ANNUAL DINNER

Presentation of Awards

Friday, Oct. 19

Morning

ASM—PHYSICAL METALLURGY

Particle Size Analysis of Metal Powders—C. C. Gregg and Bernard Kopelman, Sylvania Electric Products, Inc., Bayside, N. Y.

Interrelation of Mechanical Properties, Casting Size, and Microstructure of Ductile Cast Iron—R. W. Kraft and R. A. Flinn, Metallurgy Department, American Brake Shoe Co., Mahwah, N. J.

Gas Evolution from Gray Cast Iron During Enameling—L. F. Porter, Research Metallurgist, and P. C. Rosenthal, Professor of Metallurgy, Department of Mining and Metallurgy, University of Wisconsin, Madison, Wis.

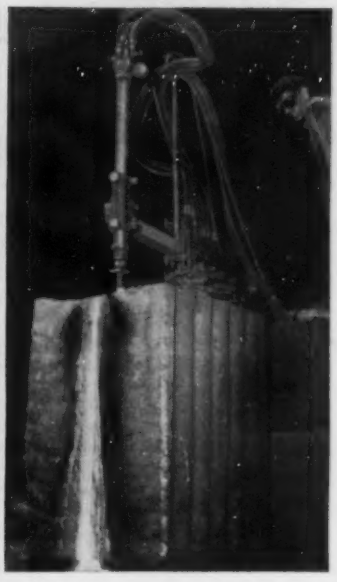
Aluminum-6 Pct Magnesium Wrought Alloys for Elevated-Temperature Service—K. Grube, Research Engineer, and L. W. Eastwood, Supervisor, Nonfer-

These Metalworking Methods Save Time and Money

These six methods for keeping production geared to current demands are typical of the many processes and products available through LINDE. Not shown, but equally available to LINDE customers, is the invaluable combination of knowledge, technical skills, and wide practical experience that makes such developments possible.

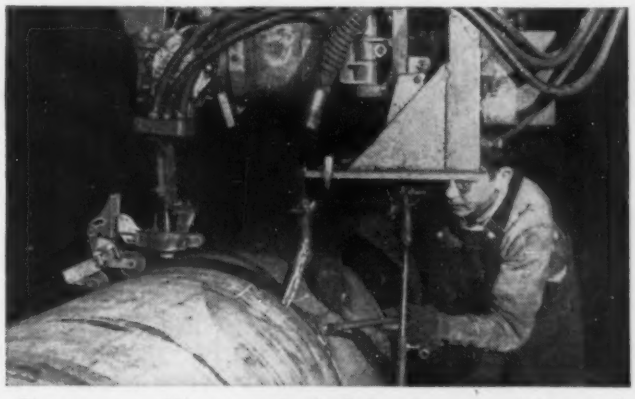
Whatever you do with metals, there is a good chance that LINDE know-how, show-how, and equipment can help you do it better, quicker, or cheaper. Telephone or write our nearest office today.

LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: Dominion Oxygen Company, Limited, Toronto



(Left) Flame-hardening gives added service life to parts by providing a hard, wear-resisting surface on a tough, ductile core. (Right) Oxygen-cutting equipment easily slices steel up to 60 in. thick. A 30-in. cut through this 45-in. thick ingot took only 15 minutes.

HELIARC welding in a protective shield of argon or helium gas easily joins hard-to-weld metals such as aluminum, magnesium, stainless steel, and copper alloys. Absence of flux and spatter reduces cleanup and finishing costs.



UNIONMELT welding, a mechanized electric process, joins metals of any thickness without sparks, spatter, smoke, or flash. Welding speeds as much as twenty times greater than by other similarly applicable methods are common.

Powder-scarfing halves conditioning costs on stainless steel. One 8-hr. shift, using two blowpipes, easily powder-scarfs 22 to 24 ingots of 1,000 lb. each.

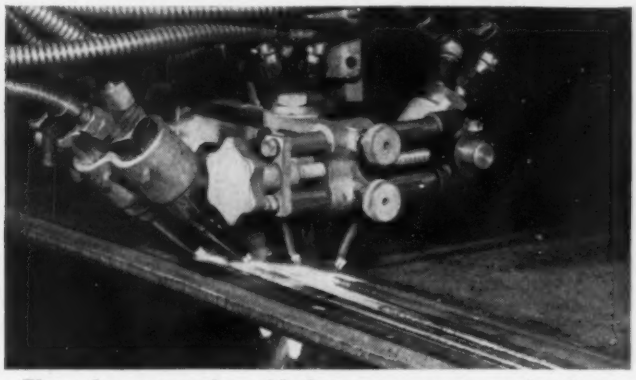


Plate-edge preparation with OXWELD apparatus makes it possible to cut steel plate to size and bevel the edges for welding in one, quick, oxygen-cutting operation.

Linde Trade-Mark

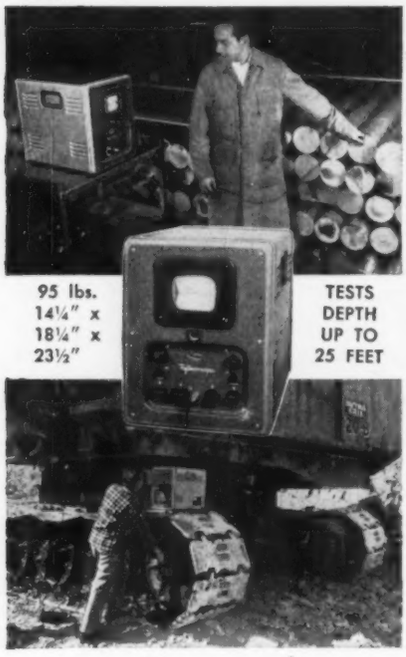
Products and Processes for MAKING, CUTTING, JOINING, TREATING, AND FORMING METALS

The terms "Heliarc," "Linde," "Oxweld," and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.

Sperry

REFLECTOSCOPE
MEANS
"ON THE JOB"
Ultrasonic
INSPECTION OF METALS
AT LOW COST
IT'S *Portable*, TOO

Reflectoscope non-destructive testing locates internal defects accurately—instantaneously. Penetrates up to 25 feet. Tests raw stock, semi-finished and finished products and detects fatigue fractures. Available for rent, for lease and for sale. Write for descriptive bulletin 50-105.



95 lbs.
14¼" x
18¼" x
23½"

TESTS
DEPTH
UP TO
25 FEET

THIS BOOKLET CAN SAVE YOU MONEY AND SPEED UP PRODUCTION. WRITE TODAY.

SPERRY
Products, Inc.
DANBURY, CONNECTICUT

Please send me the following:

☐ REFLECTOSCOPE BULLETIN 50-105
☐ NAME OF NEAREST REPRESENTATIVE

NAME .....
TITLE .....
COMPANY .....
CO. ADDRESS .....
CITY ..... ZONE ..... STATE .....

SPERRY ALSO MANUFACTURES COUPLINGS, HYDRAULIC CONTROLS AND OTHER TESTING EQUIPMENT

Program

rous Metallurgy, Battelle Memorial Institute, Columbus, O.

A Study of the Microhardness of the Major Carbides in Some High-Speed Steels—P. Leckie-Ewing, Metallurgist, Union Twist Drill Co., Butterfield Division, Rock Island, Quebec, Canada.

AWS—INERT-ARC WELDING

Aircomatic Welding-Refinery Components and Pressure Vessels—S. Yaczko, United Engineers & Constructors, Inc.

Shielded Inert Gas Metal Arc Welding—H. T. Herbst, Linde Air Products Co.

Performance of High-Strength Aluminum Alloy Weldments—W. R. Apblett and W. S. Pellini, Metallurgy Div., Naval Research Lab.

Thoriated Tungsten Electrodes—Their Welding Characteristics and Applications—G. J. Gibson and R. O. Seitz, Air Reduction Sales Co.

METALLIZING

Fundamentals of the Metallizing Process—F. J. Keller, Aluminum Research Labs.

New Developments on Metallizing During the Past Ten Years—Sam Tour, Sam Tour and Co.

Typical Applications of Metallizing—K. B. Smith, Dix Engineering Co.

Award Winners

Presentation of three top awards will be a feature of the annual dinner of the ASM, Thursday, Oct. 18, which will be held in the grand ballroom of the Hotel Statler in Detroit.

The Sauveur Achievement Award will be presented to Dr. Robert F. Mehl, head, Department of Metallurgy, Carnegie Institute of Technology, Pittsburgh.

Dr. Paul D. Merica, executive vice-president, International Nickel Co., New York, is the 1951 recipient of the ASM gold medal.

The 1951 ASM medal for the advancement of research will go to Gwilym A. Price, president, Westinghouse Electric Corp., Pittsburgh.

ANOTHER
handy
way

to get the fastest, easiest metal-cutting—tell your supplier you want VICTOR hand and power hacksaw blades and flexible-back band saws.

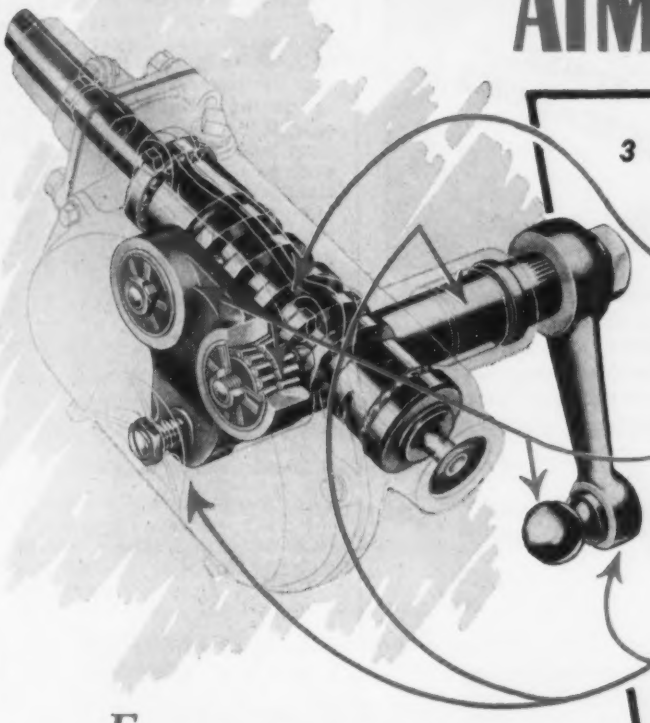
Tell him, too, to send you some handy VICTOR Metal-cutting Booklets—authoritative, timely facts on the selection, use and care of metal-cutting equipment, plus handy hints on faster, easier production.

Sold only through recognized distributors

1079A VICTOR
SAW WORKS, INC · MIDDLETOWN, N.Y., U.S.A.

Makers of Hand and Power Hack Saw Blades, Frames and Metal Cutting Band Saw Blades

There's Long, Hard Wear in STEERING GEARS ...PUT THERE BY 'SURFACE' RX PREPARED ATMOSPHERES



Ever hear of an auto accident due to steering gear going bad? Quite likely you never will, because right before your eyes is proof that steering mechanisms (other parts and products, too) are made safe and dependable.

All vital and moving parts of the steering assembly shown above undergo one or more controlled atmosphere heat treatments: *carburizing, cyaniding, clean hardening,* where results are uniform and consistently within close tolerances.

These controlled atmosphere heat treatments are carried out in radiant tube-fired furnaces of types best suited for handling the particular parts. The furnace types include pit, rotary hearth and continuous articulated link belt types.

RX PREPARED ATMOSPHERES

Atmospheres for these 3 distinctly different heat treat processes are prepared in 2 centrally located 'Surface' RX generators manifolding the RX carrier gas for all atmosphere requirements. Saves money, saves space!

3 Controlled Atmospheres for Heat Treating

Work flow in the plant producing this steering gear is arranged around 3 controlled atmosphere processes: *carburizing, dry cyaniding, clean hardening.*

- **Carburizing:** Steering gear cams, the "heart" of the assembly, are carburized in 4 'Surface' pit type radiant tube furnaces each with an enriched RX controlled atmosphere. Each furnace handles about 1500 lbs. net. Minimum hardenable case depth of 0.040-in.
- **Dry Cyaniding:** Studs and balls subject to frictional wear and impact stress in final assembly are given optimum physical properties by a dry cyaniding treatment with a 'Surface' RX atmosphere enriched with natural gas and ammonia. Studs are cyanided to case depth of 0.008-in. Balls are treated to case depth of 0.010-0.015-in. Heat treatments are accomplished in a continuous articulated link belt furnace.
- **Clean Hardening:** Lever shafts and steering arms are first isothermally annealed, then clean hardened in a 'Surface' rotary hearth furnace with radiant tubes and an RX controlled protective atmosphere.

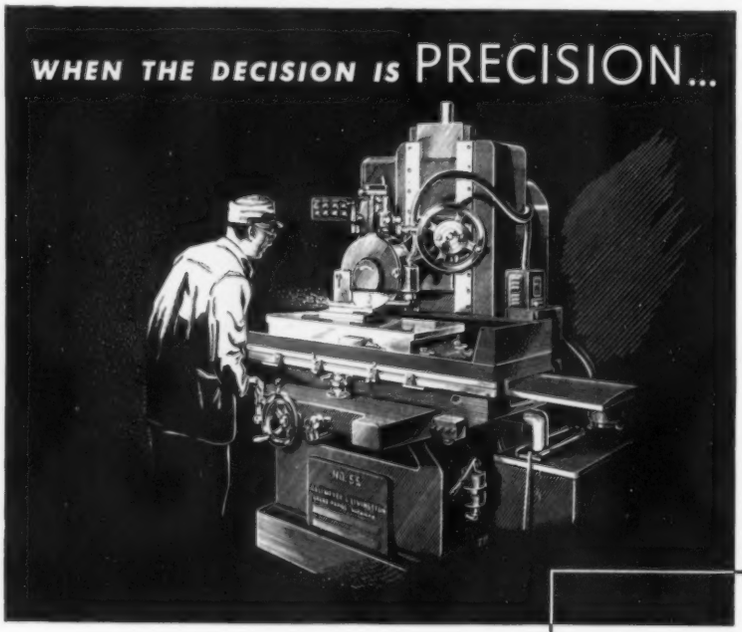
'Surface' RX generators for making prepared atmospheres are employed successfully in hundreds of plants for many processes: carburizing, clean hardening, bright annealing, carbon restoration, homogeneous carburizing and dry cyaniding.

'Surface' is a pioneer in prepared atmosphere equipment, furnishing not only RX, but also DX, NX, HX, HNX, AX and Char-Mo gas atmospheres. *Send for Bulletin SC-155 on prepared atmospheres. Write today on your letterhead.*

'Surface' INDUSTRIAL FURNACES

SURFACE COMBUSTION CORPORATION · TOLEDO 1, OHIO

Get
UNIFORM MACHINABILITY
FAST, LOW COST PRODUCTION
with
Wyckoff
COLD FINISHED
STEEL
CARBON AND ALLOY
FEWER OPERATIONS
COLD FINISHED STEEL
Controlled CARBON and ALLOY
PRECISION DIMENSIONS, ACCURATE SHAPES AND DEPENDABLE FINISH AUTOMATICALLY GIVE YOUR END-PRODUCTS THESE DESIRABLE CHARACTERISTICS
WYCKOFF STEEL COMPANY
FIRST NATIONAL BANK BUILDING • PITTSBURGH 30, PA.
3200 S. KEDZIE AVENUE • CHICAGO 23, ILLINOIS
Works at: Ambridge, Pa. • Chicago, Ill.
Newark, N.J. • Putnam, Conn.
4 CONVENIENT MILLS TO SERVE YOU!

WHEN THE DECISION IS PRECISION...

Where extreme tolerances are not required, the choice of any particular grinding machine may not be too important. But, where absolute precision is demanded, the choice is usually *Grand Rapids*.
Defense orders make it impossible to fill orders as quickly as we desire—but we know our customers can appreciate the reasons for delay As always we'll do our best to serve you.
GALLMEYER & LIVINGSTON CO.
200 Straight Ave., Grand Rapids, Mich.
Grand Rapids Grinders
—World's finest
GALLMEYER & LIVINGSTON

—Program—

Librarians Plan Features

AS one of the participating societies at the World Metallurgical Congress, the Metals Section of Special Libraries Association will present a program in the English Room at the Hotel Statler, Detroit, October 18-19. All sessions will be open to visitors.

Throughout the week of October 15-19 they will have an exhibit in the ASM section of the exposition. The SLA booth will be a miniature working library, with a metals librarian in constant attendance. There will be exhibitions of reference services, foreign and American technical books and periodicals, as well as translations of foreign works. Card catalogs will be available for study and bibliographies have been prepared to give away.

PROGRAM

Thursday, Oct. 18, 10 a.m.-12 m.

British Guides to Metallurgical Literature and Information, by Benjamin Fullman, chief information officer of British Non-Ferrous Metals Research Assoc.

The Literature on Corrosion, by I. M. Parker, corrosion engineer of Plantation Pipe Line Co. and editor of CORROSION. (Demonstration of the NACE punched card classification.)

Experience with the ASM-SLA Classification of Metallurgical Literature, by Alvina Wassenberg, Librarian, Kaiser Aluminum and Chemical Corp. (Demonstration of punched cards.)

2:30-4 p.m.

Why Metal Companies Support Special Libraries, by W. M. Peirce, New Jersey Zinc Co., President of A.I.M.E.

The Literature and the Research Metallurgist, by C. A. Zapffe, consulting metallurgist.

Plant Metallurgical Uses of Literature, K. L. Fetters, special metallurgical engineer, Youngstown Sheet and Tube Co.

Friday, Oct. 19, 9:30 a.m.-12:30 p.m.

Problems of the Small Metallurgical Library — discussion group, 9:30-10:30.

Questions and Answers, Literature Problems of the Metallurgist. Jean Wesner, Librarian of Bethlehem Steel Co. and a panel of metals librarians will answer questions.

Afternoon

Visits arranged by Michigan Chapter of SLA and Detroit committee:
1.) Plymouth Div. of the Chrysler Corp.
2.) Research library of the General Motors Corp.

Round-table discussion, library problems, 2 p.m.

HAVE YOU SEEN THIS NEW BOOKLET?

IT TELLS HOW TO DO THE HARD JOBS

Better cleaning cuts costs in aircraft production. This 48-page illustrated booklet outlines all the big cleaning jobs. Have you seen the latest Oakite recommendations on:

¶ How to clean aluminum in preparation for anodizing? *See page 4.*
¶ How to prepare aluminum for spot welding? gas welding? heliarc welding? *See pages 10 to 14.*
¶ How to remove welding flux? *See page 14.*
¶ How to prepare aluminum for painting? *See page 15.*
¶ How to clean aluminum before and after heat treating? *See page 20.*
¶ How to strip paint from aluminum? *See page 22.*
¶ How to clean magnesium? *See page 27.*
¶ How to select and install cleaning tanks, rinse tanks and sprays, and spray-washing machines? *See pages 31 to 35.*
¶ How to treat water in paint spray booths? *See page 36.*
¶ How to clean engine test cells? *See page 40.*

FREE Write for your copy of the booklet. You'll find added interest in the Oakite Aluminum-Cleaning Chart covering the cleaning, etching, de-smutting, de-oxidizing and pre-paint treatment for many alloys.

OAKITE PRODUCTS, INC.
27 Thames St., New York 6, N. Y.

Send me a FREE copy of your booklet *"How to Clean Metals in Aircraft Production."*

*Name*_____

*Company*_____

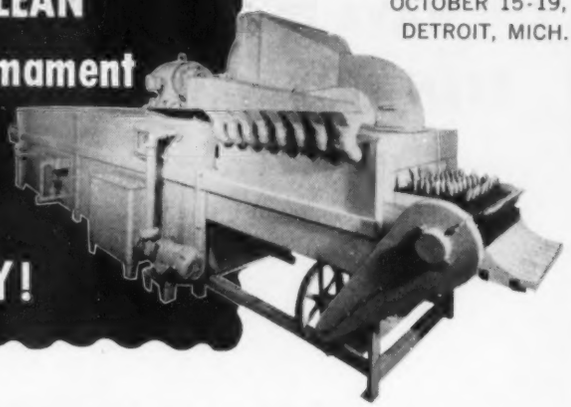
*Address*_____

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

Technical Service Representatives Located in Principal Cities of United States and Canada

VISIT OUR BOOTH No. H-502
NATIONAL METAL EXPOSITION
OCTOBER 15-19,
DETROIT, MICH.

HOW TO CLEAN Metal Rearmament Products MORE EFFICIENTLY!



This new free Booklet shows how! Shells, cartridges, machine gun barrels, rifle parts, gun parts, cartridge cases—the most efficient methods of cleaning and handling these and other metal rearmament products—are fully described and pictured in this new folder.

WRITE FOR YOUR FREE COPY—TODAY.

ALVEY-FERGUSON

THE ALVEY-FERGUSON CO.,
560 Disney St. Established 1901 Cincinnati 9, Ohio

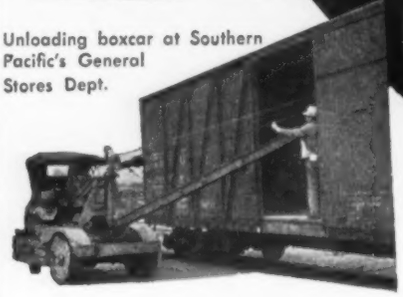
50th ANNIVERSARY

Manufacturers of A-F Conveying Equipment and Washing Machines for Industry

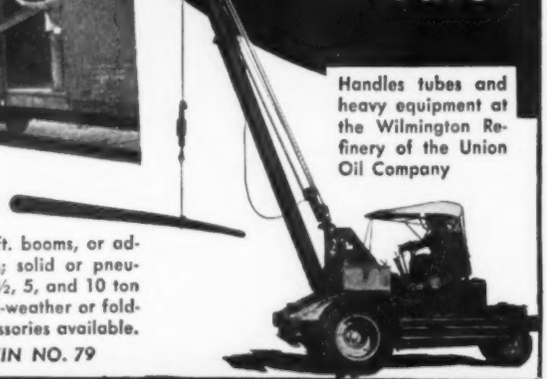
Heavy Industries Use KRANE KAR SWING-BOOM MOBILE CRANE to Cut Costs by Handling Loads Easier, Faster, Safer

Stacking fittings at a Los Angeles Public Utility

Unloading boxcar at Southern Pacific's General Stores Dept.



Handles tubes and heavy equipment at the Wilmington Refinery of the Union Oil Company



Gas or diesel, 12 to 37 ft. booms, or adjustable telescopic booms; solid or pneumatic rubber tires. 1½, 2½, 5, and 10 ton cap. Buckets, magnets, all-weather or foldable tops, and other accessories available.

WRITE FOR BULLETIN NO. 79

SILENT HOIST & CRANE CO. 851 63rd ST., BROOKLYN 20, N.Y.

—Free Publications—

Foundry machinery

Machinery for every foundry operation is described in a recent book. The publication comprises leaflets and folders on the complete line, including moulding and sand preparing machines, fettling machines and sand blast apparatus, charging installations and cupolas. *Badische Maschinenfabrik, A.G.*

For free copy insert No. 14 on postcard p. 365.

Knife grinders

Heavy-duty knife grinders capable of handling a variety of work at high speeds are described in a new bulletin. The machine is designed for sharpening of sewing and kettling knives for all types of sewing machines, and kettling devices and lock parts for knitting machines. *Wilhelm Maier.*

For free copy insert No. 15 on postcard p. 365.

Direct fired heaters

A complete, self-contained heating system, gas or oil fired and completely automatic in operation, is described in a new 18-p. catalog. A high ratio of heated air to fuel input results in an economical heating system for buildings of large open area. Low initial cost, economical automatic operation and flexibility are features of the Airtherm heaters. *Airtherm Mfg. Co.*

For free copy insert No. 16 on postcard p. 365.

Expansion joints

A 40-p. catalog containing over 78,000 possible combinations of bellows type expansion joints has recently been published. The reference handbook illustrates a diversified line of standard and special bellows assemblies used to take up expansion, contraction and offset movement in pipes and conduits. *Solar Aircraft Co.*

For free copy insert No. 17 on postcard p. 365.

Valve guide

A handy guide to Edward cast and forged steel valves for industrial power plant installations is available. Designed for easy valve reference and identification, the new bulletin illustrates and describes only valves applicable to power plant use. *Edward Valves, Inc.*

For free copy insert No. 18 on postcard p. 365.

Rolling mills

Increased demands for higher output with minimum tolerances in rolled material have been met with development of new methods and designs. Many such machines are described in a new 48-p. picture-book showing Schloemann installations in many plants. *Schloemann, A.G.*

For free copy insert No. 19 on postcard p. 365.

Static hearth furnaces

The complete line of Incandescent static hearth furnaces is described in *Industrial Furnaces and Equipment.* Pictured are recuperative and deep recuperative furnaces, double-deck tool hardening furnaces, high-speed steel hardening furnace. Also illustrated are coal-fired furnaces, suspended pot furnaces and cyanide bath furnaces. *Incandescent Heat Co., Ltd.*

For free copy insert No. 20 on postcard p. 365.

Tube extrusion

Mechanical extrusion presses for manufacture of small diameter seamless tubes are described in a recent 4-p. folder. Presses are particularly suitable for economic production of gas piping, boiler and high alloy tubes of ⅜ to 3 in. OD. *M. F. Meer, A. G.*

For free copy insert No. 21 on postcard p. 365.

Electrodes

A pocket book *Hobart Electrodes and Welders' Vest Pocket Guide* contains much useful arc-welding information. Data on metals, electrodes, proper welding procedures, color identification, types of joints and causes of common welding trouble are covered in the booklet. *Hobart Bros. Co.*

For free copy insert No. 22 on postcard p. 365.

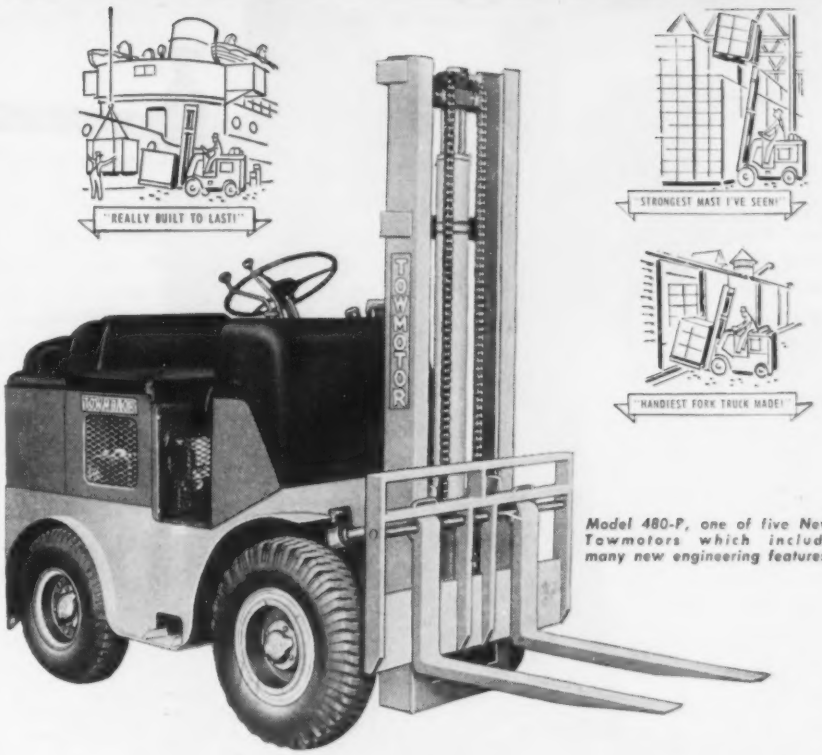
Carbide tool grinders

Hammond carbide tool grinders are described in a new 12-p. bulletin. These, with chip breaker and diamond finishing grinders, are designed to keep pace with the widespread use of carbide tools in all manufacturing operations. Grinders are available in a range of sizes, for wet or dry operation. *Hammond Machinery Builders, Inc.*

For free copy insert No. 23 on postcard p. 365.

Turn Page

handling experts everywhere are talking about the NEW TOWMOTORS!



Model 480-F, one of five New Towmotors which include many new engineering features.

No wonder the new TOWMOTORS are such a sensation just look at these features:

- Extra heavy duty frame
- Drop forge beam steering axle
- Functionally styled cowl
- Full vision instrument panel
- Precision controls in easy reach
- Super-strength forks
- Maximum free lift
- Engineered tire equipment
- Double universal joint
- Precision mast construction
- Maximum operating comfort
- Heavy duty hydraulic brakes
- One piece drive axle assembly
- Heavy, industrial-type engines

Get the facts—see the new Towmotor 15-minute film, "What Makes It Tick?"

TOWMOTOR
THE ONE-MAN-GANG

FORK LIFT TRUCKS and TRACTORS

RECEIVING • PROCESSING
STORAGE • DISTRIBUTION

TOWMOTOR CORPORATION
Div. 15, 1226 E. 152nd St., Cleveland 10, Ohio

☐ Send me more information on the new Towmotor
☐ I'd like to see the new film, "What Makes It Tick?"

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ STATE_____

HOW MANY PEOPLE HAVE YOU TALKED TO ABOUT AMERICANISM TODAY?

If it's an

R.D. WOOD

*...It's Good**

3000-ton hydraulic forging and cogging press.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE
ACCUMULATORS
ALLEVIATORS
INTENSIFIERS

R. D. WOOD COMPANY
PUBLIC LEDGER BUILDING, PHILA. 5, PA.

Est. 1803 WOOD

*Find out why. Send for your free copy of our new photographic book of plant facilities

—Free Publications—

Grinding

Some of the most frequently asked questions on grinding and the grinding process have been answered in a new 42-p. pocketbook. Titled *What Do You Know About Grinding Wheels*, the book presents 36 questions and answers. Information on proper selection of wheels and speeds for various jobs will be of special value. *Sterling Grinding Wheel Div., Cleveland Quarries Co.*

For free copy insert No. 24 on postcard p. 361.

Industrial trucks

High and low-lift platform trucks, fork trucks and mobile cranes are described in a new 12-p. brochure. Capacities and dimensional specifications on each class of truck, and a description of major construction features, are given. Several novel materials handling ideas are presented in picture form. *Elwell-Parker Electric Co.*

For free copy insert No. 25 on postcard p. 361.

Hydraulic valves

Designers will find a complete file on hydraulic valves in this 28-p. catalog. Working drawings and specifications are furnished for each model and size valve. Also shown are cut-away views for each series and operational diagrams for five piston designs. Featured in the catalog are "floating piston" design, "O" rings for sealing stem and cover, and large passages for unrestricted flow. *Rivett Lathe & Grinder, Inc.*

For free copy insert No. 26 on postcard p. 361.

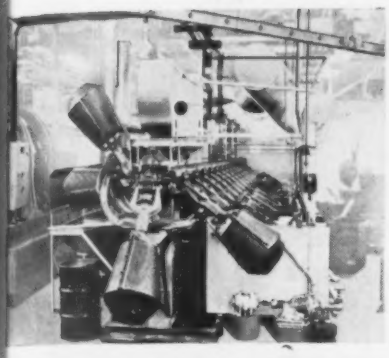
Air control panel

A complete data sheet for press designers, plant engineers and production executives showing the air control panel adopted as standard equipment for large presses by a leading automobile manufacturer is available. The setup includes provision for brake, clutch, pressure cylinders, counterbalance cylinders, "iron hands," and die grinding tools. *C. A. Norgren Co.*

For free copy insert No. 27 on postcard p. 361.

NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies . . . fill in and mail postcard on page 365 or 366.



Plates and processes bulky parts in volume

Operation of a new barrel plating and processing machine, the Stevens Super E, is entirely automatic. Barrels revolve continuously through the entire cleaning, plating, rinsing and drying cycle. The only manual process required is the loading of the barrels at the beginning of the plating cycle and a mechanical loader used as an accessory could eliminate this. The unit can be installed as an integral part of a materials handling system and eliminate virtually all labor other than supervision and maintenance of plating baths, from the processing or metal finishing of work parts. *Frederic B. Stevens, Inc.*

For more data insert No. 28 on postcard p. 365

Safety and press speed increase with loader

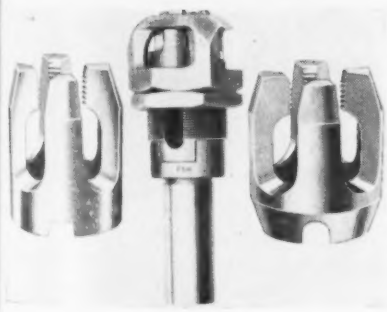
With a new automatic punch press loader, punch press speeds on redraw operations increase by 10 to 60 pct over hand feeding, with operator safety assured by removing the operator from the press feed job. With the Lodac feeder, mechanical fingers pick up parts after first draw and feed one or more consecutive redraw presses at speeds to 1200 parts per hr. Similar fingers remove the parts from the press to feed them on another conveyer for feeding further press operations. The complete operation is set by the speed adjustment of the Lodac press feeder. *Magnaflux Corp.*

For more data insert No. 29 on postcard p. 365

Presses used in munitions production

This battery of five hydraulic gas check presses will be used in ammunition assembly. After the live fuze is inserted in the shell, soft metal sealing plugs are compressed into the shell case under high pressure. This assures that the powder flash will not prematurely explode the projectile. These presses, which are C-frame type with double action ram, are equipped with double safety levers, both of which must be actuated before the press will close. *Elmes Engineering Div., American Steel Foundries.*

For more data insert No. 30 on postcard p. 365



Monocone dies give choice of two designs

Companion products to the Duocone line of dies and holders are the new Monocone dies and die holders for screw machines and other equipment. The Monocone tools provide users with two types of concentric-adjustment dies — flat-backed and cone-backed. Dies are high speed or carbon steel and available in screw gage sizes 0 through 14 and in fractional sizes from 1/16 through 1⅛ in. They are conical at the nose end only. Holders are made in reversing and releasing types. *Pratt & Whitney, Div. Niles-Bement-Pond Co.*

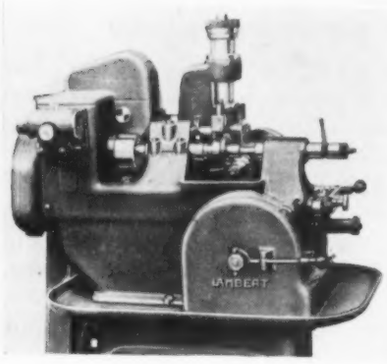
For more data insert No. 31 on postcard p. 365

Turn Page

Stud welder rated at eight welds per min

A new high-speed dual head stud production unit combines precise fast operation and heavy-duty construction features. Accurate placing of the work in V holder is insured by a built-in micro-switch that prevents operation if the work is not correctly located. After loading suspension button and arc shield into each of the two welding heads and placing the work in V holder, operator presses the two start buttons. The unit then automatically completes the operation. Automatic clamping device prevents movement of the work; leader pin guides insure accurate positioning of the work in relation to welding heads; and an automatic spark shield protects the operator. *KSM Products, Inc.*

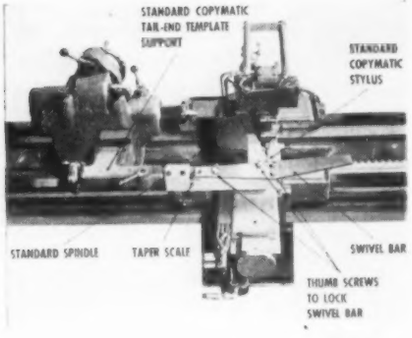
For more data insert No. 32 on postcard p. 365



Gear hobber effects 50 pct time savings

A new Lambert Type 75 semi-automatic gear hobbing machine is specifically for cutting gears with straight teeth, gears with teeth inclined up to an angle of 18°, worm wheel (cut radially) and, with a special attachment, bevel gears with straight teeth. This Swiss machine having automatic radial and longitudinal feed should be of interest on defense work requiring quantity production of small gears. Combined radial movement with longitudinal movement shortens the overall stroke and accordingly increases the productive capacity of the machine. *Carl Hirschmann Co.*

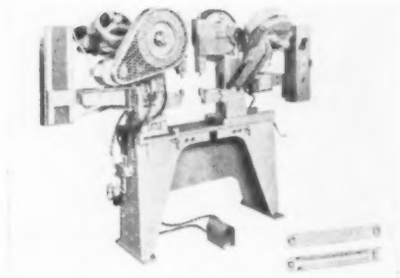
For more data insert No. 33 on postcard p. 365



Taper turning made easier and faster

A new flat template device for Copymatic lathes has a direct reading scale upon which the desired taper may be set. Workpieces that have peripheries or bores of continuous tapers may be contour turned directly from the new attachment. When tapers form but a part of the surface, the attachment is used to speed production of a round template. This round template is then placed between the standard Copymatic duplicating centers for tracer controlled duplication in any quantity. Field installation of the new attachment is easily made. *Lodge & Shipley Co.*

For more data insert No. 34 on postcard p. 365



Double Clinchor unit sets two nuts at once

A new double Clinchor unit is tooled to feed and set two $\frac{3}{8}$ x $\frac{1}{2}$ x 3/16 in. thick Fabri-Steel nuts at each operation. The anvil position of the left hand Clinchor is adjustable in a front-to-back direction, and also in height. The anvil position of the right hand Clinchor is adjustable in a left-to-right direction. Both Clinchors are tripped by the same foot-operated valve. *Tomkins-Johnson Co.*

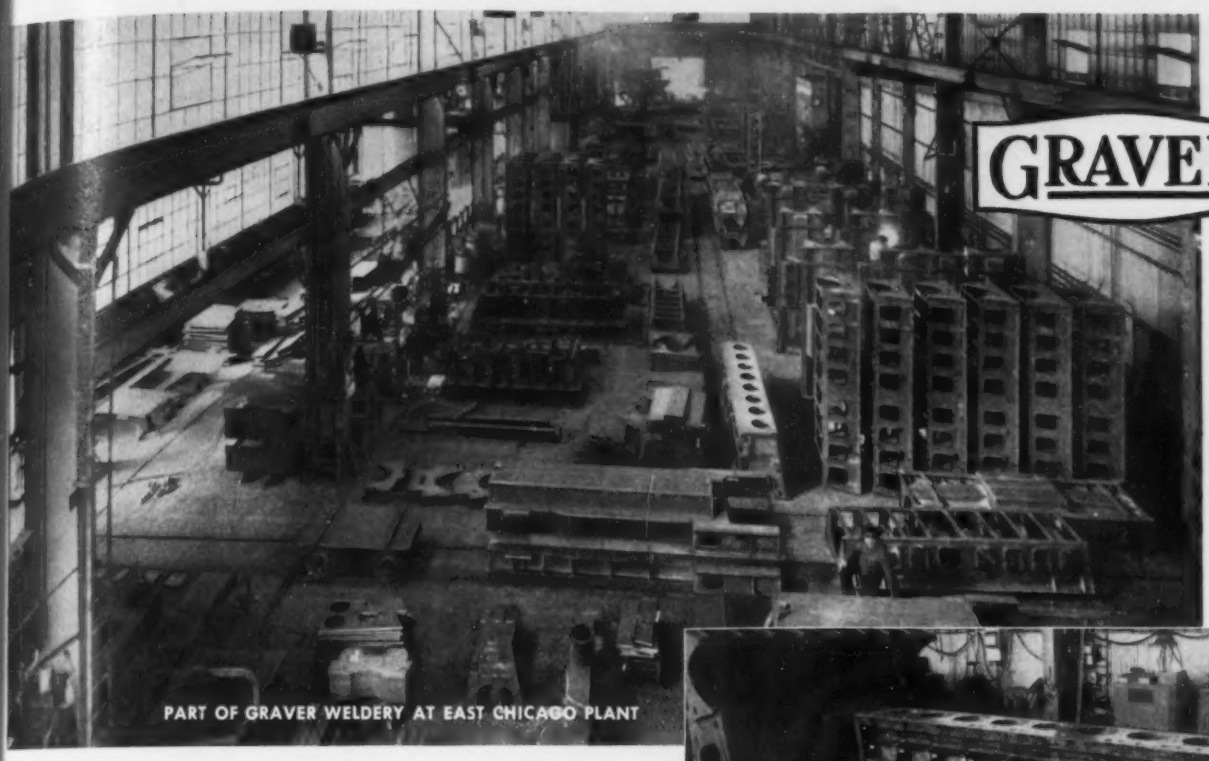
For more data insert No. 35 on postcard p. 365

Dump truck outfit cuts handling costs

Cinders, sand, gravel, cement, concrete can be economically handled with the new Kalamazoo Model 2500 speed truck. Powered with a Wisconsin 13 hp engine, the unit has proven versatile and dependable. An automotive type, dry-plate clutch and three-speed transmission is used. The final drive acts on both rear wheels. Hopper can be discharged from the driver's seat. *Kalamazoo Mfg. Co.*

For more data insert No. 36 on postcard p. 365

Turn to Page 374



PART OF GRAVER WELDERY AT EAST CHICAGO PLANT

WELDMENTS

in a wide range

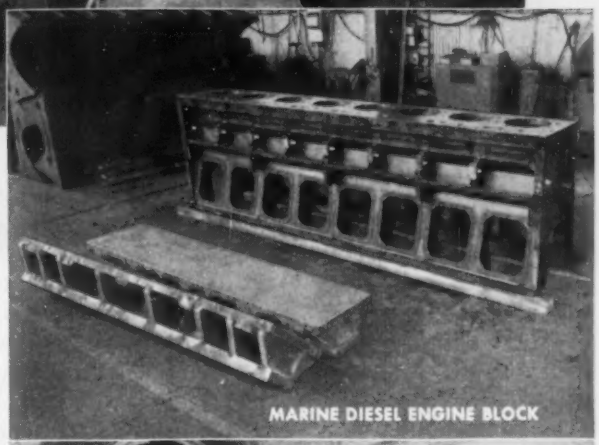
by GRAVER

Manufacturers in the heavy industries field have for many years found Graver an excellent source for welded subassemblies. From Graver's well-equipped weldery has flowed a continuous succession of weldments for a wide range of industries. Pictured are examples of recent Graver work . . . mass-produced but expertly fabricated . . . with the special advantages secured through subcontracting to Graver: economy in cost, rigid quality controls, creative engineering and sound welding research.

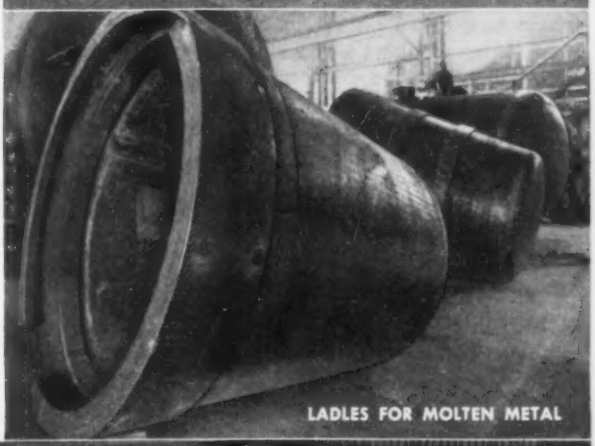
GRAVER TANK & MFG. CO., INC.

EAST CHICAGO, INDIANA

NEW YORK • CHICAGO • PHILADELPHIA • WASHINGTON
DETROIT • CINCINNATI • CATASAUQUA, PA.
HOUSTON • SAND SPRINGS, OKLA.



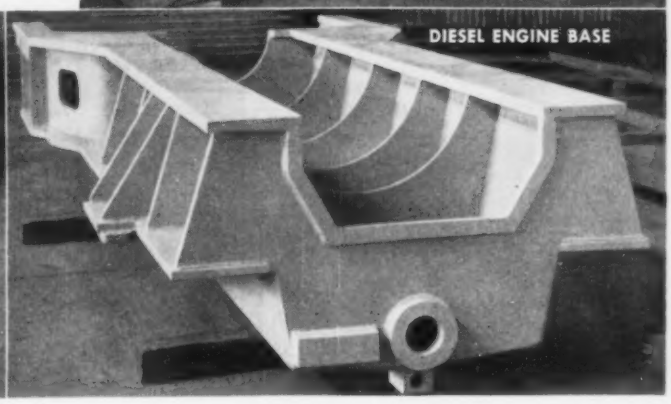
MARINE DIESEL ENGINE BLOCK



LADLES FOR MOLTEN METAL

LEAD POT

TIN POT



DIESEL ENGINE BASE

don't scrap metal by turning!

...save by Swaging on

TORRINGTON SWAGERS

The Torrington Rotary Swaging Machine uses every bit of stock. With 4000 hammer blows a minute, swaging reduces, sizes, rounds, tapers and points rod, wire and tubing. It makes metal tougher and more resilient. It hammers away minor surface defects.

Torrington Swagers are built to a mechanical perfection based on our 42 years' swaging experience. Send today for your free copy of the illustrated booklet describing the machine and the method.

THE TORRINGTON COMPANY
Swager Department
555 Field Street • Torrington, Conn.

Send the coupon today for your free copy of this booklet.

Please send a copy of "The Torrington Swaging Machine" to:

Name_____

Firm_____

Address_____ 5

—New Equipment—

Continued

Impregnation service

A method of eliminating porosity in metal alloy castings and fiberglass laminates is available on a custom service basis. Parts show no discoloration nor visible results of treatment. Critical machined tolerances are unaffected. Applicable before or after final finishing coats, the method may be applied to both machined and rough parts. Resultant seal is resistant to wide temperature ranges, chemicals and solvents, and possesses high dielectrical properties. Approved by Army, Navy, Air Force, the entire treatment is available in most industrial areas on a 12-24 hr service. *Western Sealant, Inc.*

For more data insert No. 37 on postcard p. 365

Bull-nose center

Capacities up to 10 tons and head sizes up to 24 in. are the claim for a new shank-type bull-nose Red-E center. It is designed expressly for extra heavy work with two single row superaccurate, anti-friction bearings. Bearings are shrunk-on, and spaced apart and preloaded for maximum radial and thrust capacities. Head is hardened tool steel and the shank is heat treated alloy steel. *Ready Tool Co.*

For more data insert No. 38 on postcard p. 365

High tensile electrode

The metal deposited by a new electrode for cast iron welding shows a uniform amount of carbon so that the deposited material is similar to high tensile, high carbon steel, and increases the tensile strength of the weld. The electrode is identified as EutecTrode 26. *Eutectic Welding Alloys Corp.*

For more data insert No. 39 on postcard p. 365

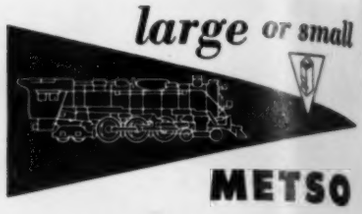
Safety tongs

Magnesium safety tongs speed press and shear feeding operations. A tapered nose unit facilitates handling of small stock. Made of alloyed magnesium, the tongs crush if accidentally caught within the die opening, eliminating possibility of damage to costly dies. *Magline, Inc.*

For more data insert No. 40 on postcard p. 365

Turn to Page 376

large or small



METSO

for all clean-ups

From the largest clean-up, e.g., gummy oil deposits from locomotive boilers to the smallest (oily ink in printer's type), count on Metso for a clean surface. Request a sample for trial in your cleaning operation.

Metso's balanced alkali-silica team removes stubborn dirt and grease for keeps. Its special efficiency prevents redeposition of removed soil.

Philadelphia Quartz Company
1056 Public Ledger Bldg.
Philadelphia 6, Pa.

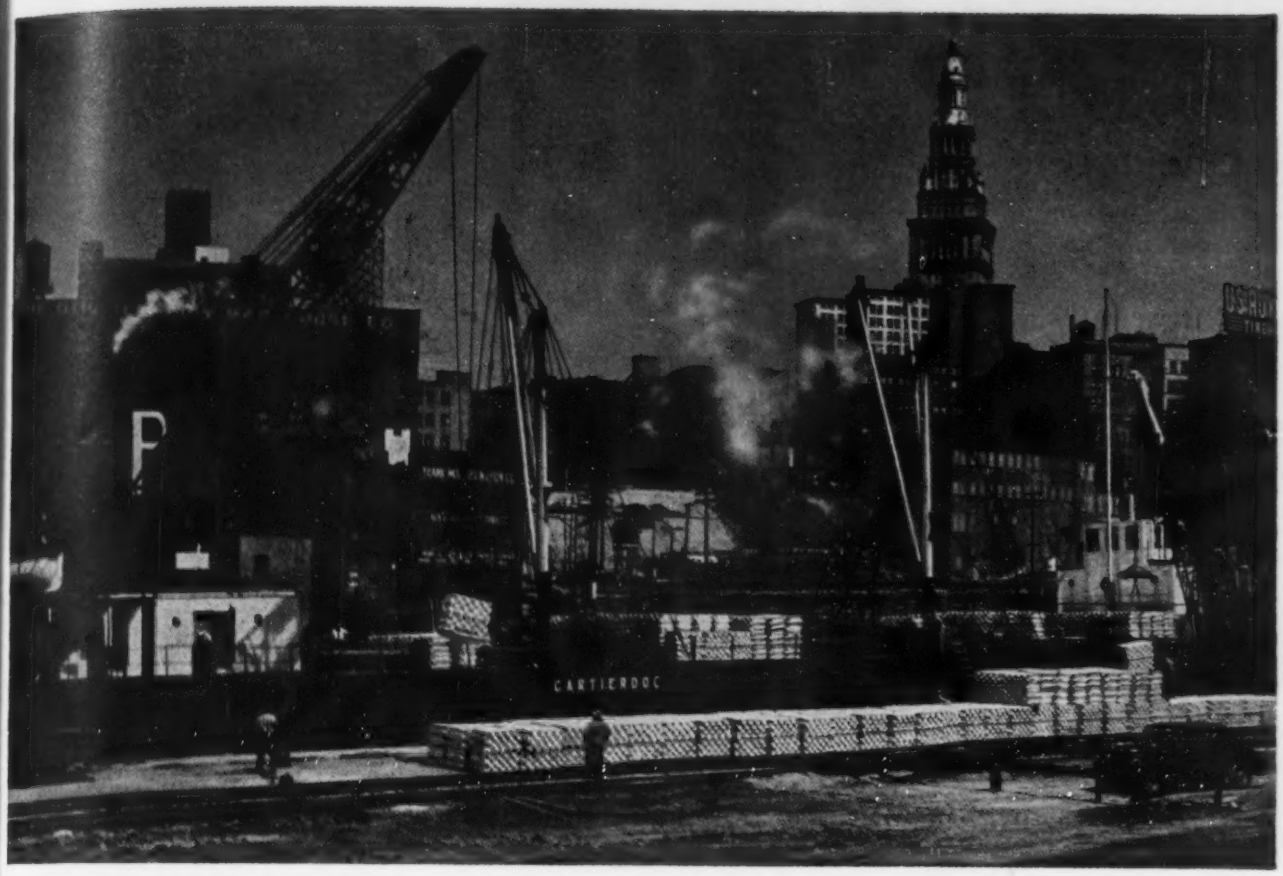
METSO®

detergents

NEED COMPONENT PARTS FOR YOUR PRODUCT?

Find the plant which can supply them in the

CONTRACT MANUFACTURING SECTION



500 TONS OF LIGHTNESS

—and more coming!

Those cranes on the Cleveland waterfront are unloading aluminum ingot produced by the Aluminum Company of Canada, Limited ("Alcan") – whose products we distribute.

From this dependable source, millions of pounds of aluminum per year are shipped to American fabricators. A desirable, economical supplement to U. S. production, Alcan aluminum helps to keep more than a million people busy in foundries and fabricating plants in the United States – busy turning out thousands of lightweight, long-lasting products for defense, industry, farm, and home.

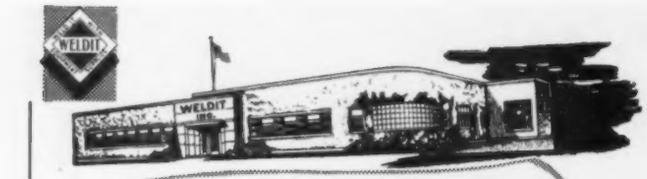
But even that much aluminum isn't enough to satisfy the demand. So in Kitimat, British Columbia, Alcan is building a new plant, which in its first phase will provide 200 million pounds more aluminum per year.

ALUMINUM IMPORT CORPORATION

Distributing company, in the Western Hemisphere, of the **ALUMINIUM LIMITED** *group*

Offices and agents in 40 cities
630 Fifth Avenue, New York 20 — Av. Ing. Luis A. Huergo 1279, Buenos Aires — Rua Da Quitanda 96, Sao Paulo

Cable address: ALIMPORT



You Are Invited

You are cordially invited to be the guest of Weldit, Inc., for the purpose of visiting our modern plant during your attendance at the National Metal Show and World Metallurgical Congress, Oct. 14th through the 19th.

We are proud of our manufacturing facilities and plant, and believe that you will be interested in inspecting one of the most modern torch production processes in the United States.

Attendants at our Metal Show Booth will be most happy to arrange for your tour of the Weldit plant.

Cordially yours,
Otis Smith, President

Weldit

WELDIT Booth Number, H-545

WELDIT INC. 990 OAKMAN BOULEVARD DETROIT 6, MICH.

THE ONLY NEW PLANT IN EASTERN U.S.

EQUIPPED FOR **STEEL PICKLING**

COILS UP TO 48" WIDE

Prompt Quality Service

- ROLLER LEVELLING
- EDGE ROLLING
- COIL SHEARING
- SLITTING

PICKLING coils:
1" to 48", 10 to 20 gauge
100 to 10,000 lbs.

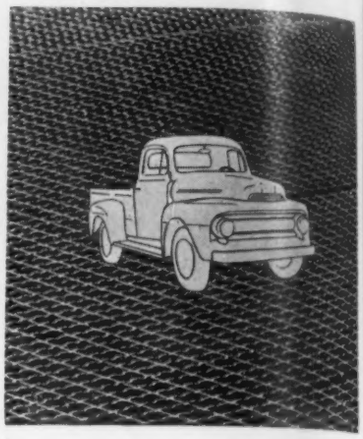
SHEETS & PLATE: Any width, any length, any thickness.

CAPACITY: 25,000 tons/month.

MARSAM CORPORATION

Subsidiary: **AMERICAN TOOL & SUPPLY CO.**

OFFICE: 822 FRICK BUILDING, PITTSBURGH 22, PA. **PLANT:** McKEES ROCKS, PA.



Safety and strength

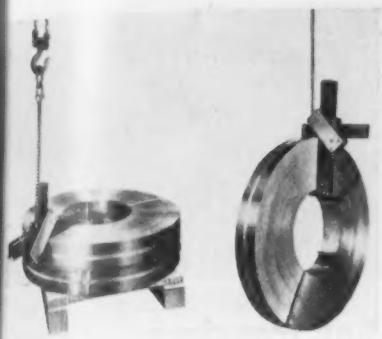
Rectangular steel bridge flooring, whether laid longitudinally or transversely on a bridge, carries H20 loading on a 15-in. circle up to a span of 48 in. and weighs approximately 19 lb. It is made with grating parallel with traffic and transverse to traffic. In the latter, the transverse bars that the tires ride on are serrated to maintain or develop greater traction for emergency stopping. A related open steel flooring for industrial and chemical plants is forged under 500 tons hydraulic pressure with a proven positive dovetail lock construction. It is swaged cold, preventing internal strains which might cause warping. Slotting terminates above the neutral axis of bearing bars, providing maximum strength. Cross bars extend below the bottom of the slot eliminating the possibility of lateral deflection. *Kerlow Steel Flooring Co.*

For more data insert No. 41 on postcard p. 365

Rectifier power units

Availability of new, custom-made ac to dc rectifier power conversion units of high current and voltage capacities has been announced. The new development is made possible by the manufacture of extra large selenium rectifier cells by Syntron's new vacuum process. Larger cells permit the use of fewer parallel elements for a given dc output and at the same time keep the weight to a minimum. *Syntron Co.*

For more data insert No. 42 on postcard p. 365



One easy motion

One operator using this grab can lift a coil from the pallet up to a vertical position in one easy motion. A prong tapered to fit between the coils, in the space made by the coil bands, is positioned while the opposite jaw is placed in the center of the coil. As the crane lifts the grab automatically adjusts to the coil size and the tapered prong slides between the coils. As the coil lifts, the grab turns to allow the coil to move to a vertical position, locked by its own weight. Handles coils to 2000 lb. *Dixon Research, Inc.*

For more data insert No. 43 on postcard p. 365

Machinery oil

Kling-Oil is a general purpose machinery oil having metal adhesiveness. It is tacky and clings tenaciously to the moving parts of machinery, reducing the number of oilings required. Reportedly no gumming or build-up is experienced after continued use. Kling-Oil has an SAE-30 viscosity. *Magnus Chemical Co., Inc.*

For more data insert No. 44 on postcard p. 365

Bright zinc process

A bright zinc process, BSZ-300, for still tank plating produces bright to brilliant deposits directly from the plating bath. Bright dipping is not essential. Parts plated by this process are said to appear brighter, stay bright longer and have higher resistance to oxidation and tarnish. No special equipment is required. The brightener is used as an additive to the regular cyanide solution. *Hanson-Van Winkle-Munning Co.*

For more data insert No. 45 on postcard p. 365

Turn Page

Why not use Perforated Metal?

This Wesix Electric Heater shows a typical application of Hendrick Perforated Metal, combining utility and attractiveness. The heater guard is 20 gauge steel, with 3/16" x 1½" side stagger perforations.

With facilities for producing any required shape and size of perforations in any commercially rolled metal, Hendrick invites inquiries from manufacturers who may be considering the use of perforated metal in connection with any of their products.

1876—Seventy-Fifth Anniversary—1951

SEE OUR CATALOG IN SWEET'S

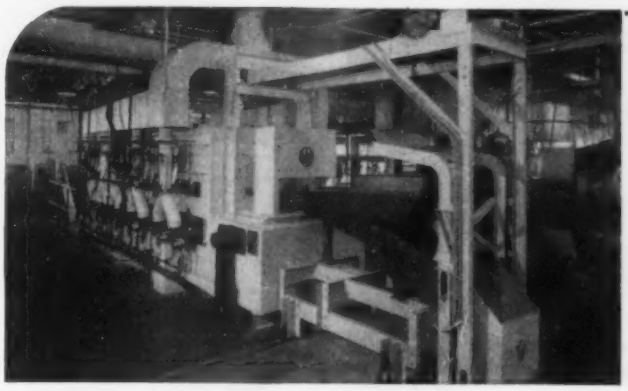
HENDRICK

Manufacturing Company

Perforated Metals
Perforated Metal Screens
Wedge-Slot Screens
Architectural Grilles
Mitco Open Steel Flooring,
Shur-Site Treads, Armorgrids

37 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities



EF

GAS-FIRED
OIL-FIRED
and ELECTRIC
FURNACES
for

AGING
ANNEALING
BRAZING
CARBON RESTORATION
CARBURIZING
CERAMIC DECORATING
DRAWING
HARDENING
HOMOGENIZING
MALLEABLIZING
NORMALIZING
NITRIDING
SINTERING
SOLUTION TREATING
SPECIAL ATMOSPHERE TREATMENTS

A SIZE AND TYPE OF FURNACE FOR EVERY PROCESS PRODUCT OR PRODUCTION

LOW COST HEAT TREATMENT
of small and medium size parts

● EF chain belt furnaces are the most satisfactory heat treating equipment yet devised for carbon restoration, scale free hardening and hardening without decarburization of small and medium size parts. Built in 11 standard sizes for capacities up to 2,000 lbs. per hour. Larger sizes to meet any requirement. Gas-fired, oil-fired or electrically heated, whichever best suits your particular requirement – and location. Estimates of equipment, installation and operating costs – and samples of treated parts–furnished promptly. Write for literature.

THE ELECTRIC FURNACE CO.
GAS FIRED, OIL FIRED AND ELECTRIC FURNACES
Salem - Ohio

KEYKOTE

NEW...HIGH SPEED PHOSPHATIZING COMPOUND

PROCESSES IN 2 MINUTES!

KELITE KEYKOTE HAS THESE REMARKABLE FEATURES:

- ✔ HIGH SPEED ... only 1 or 2 minutes for complete phosphatizing process
- ✔ Can be applied by SPRAY ... or IMMERSION in ordinary black iron tank
- ✔ NO RINSE needed (unless specified) ... won't "sludge out" ... no screen required
- ✔ A POWDERED material ... used one ounce per gallon

"KELITE" REG. U.S. PAT. OFF. • pH CHART COPYRIGHTED 1942 BY KELITE PRODUCTS, INC.

KELITE pH Control

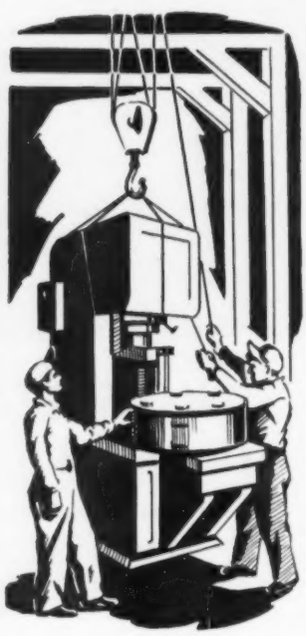
KELITE

SCIENTIFIC CLEANING THROUGH pH CONTROL

WRITE
for complete data on KEYKOTE the new scientific way to phosphatize

1250 North Main Street, Los Angeles 12, California • Service Offices in Principal Cities

When PRODUCTION *hangs by a "Thread"...*



specify the wire rope that gives the greatest service. "HERCULES" (Red-Strand) *Preformed* spools more evenly—bends more smoothly. Handles more safely. Splices more easily. Far fewer replacements are needed.

Engineered to reduce internal tension and twisting, "HERCULES" (Red-Strand) *Preformed* stays on the job—*in* the groove.

For uninterrupted production, there is only one right rope ... be sure to select the correct size and type.

LESCHEN WIRE ROPE

Feel free to consult our Engineering Department at any time for specific recommendations. A. LESCHEN & SONS ROPE CO., 5909 Kennerly Ave., St. Louis, Missouri. Warehouses and branch offices in all principal cities.

New Equipment

Ball transfers

Ball transfers are designed to move objects at all angles. Boxes can be easily maneuvered about, and sheets or plates moved to any position for cutting or other operations. Welded or bolted to steel plates the units form a table on which materials can be moved in any direction. Five basic types are available. *Mathews Conveyer Co.*

For more data insert No. 46 on postcard p. 365

Multiple spindles

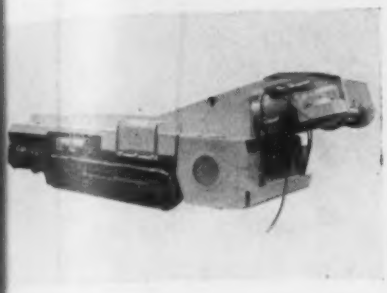
A multiple spindle drilling machine has three spindles mounted integrally to a sturdily constructed column. This medium weight machine has a 25-in. swing, a variable speed drive from which the exact spindle speed may be obtained for any size drill from ⅛ to 1 in., and an extra large table with coolant trough. The ME-25 is powered by a 1½ hp axial air gap motor. Capacity is ¾ in. in steel and 1 in. in cast iron. *Sibley Machine & Foundry Corp.*

For more data insert No. 47 on postcard p. 365

Added cleaning action

Magnusol is an emulsifiable solvent cleaner used for precleaning metal objects prior to cleaning before plating. It can be used as an additive to forming, cutting and stamping oils to insure that the existing cleaning method will continue to do the job expected of it regardless of changes made in the formula of the lubricating compounds. Magnusol has no effect on the lubricating qualities of the oils; it does act as an agent to insure good cleaning action once the metal pieces are brought in contact with the cleaning solution. *Magnus Chemical Co., Inc.*

For more data insert No. 48 on postcard p. 365



For close quarters

For mine application a new cable-reel crawler-type steel-track shuttle car has a turning radius of 14 to 16 ft. Because no clearance is required for turning wheels, a much wider conveyer is built into the body of the track-laying car for the same overall width. Improved maneuverability is illustrated by the car's ability to turn by locking one track completely. The 250-v car is driven by two 20 hp motors driving each track through single gear reduction, chain and sprocket. *General Electric Co.*

For more data insert No. 49 on postcard p. 365

Journal boxes

New roller bearing journal boxes have been designed to fit conventional freight car trucks with both the integral box type and pedestal type side frames. They can be installed to replace existing plain bearing equipment, with only a minimum of alteration to the truck side frames. These journal boxes are grease lubricated. The bearings are the straight radial type giving maximum load-carrying capacity in the space provided. *Hyatt Bearings Div., General Motors Corp.*

For more data insert No. 50 on postcard p. 365

Heat treating grid

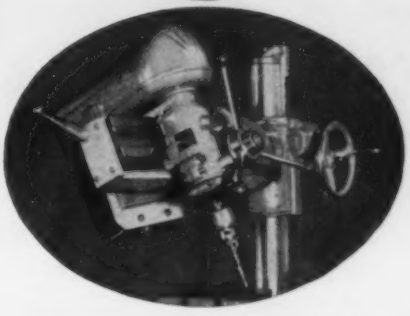
Said to meet the rigid requirements of the heat treating field, a new alloy grid is lightweight and capable of performing with a minimum of distortion for long service. It has longitudinal bars as the principal load carrying members, spaced with serpentine like intermediate bars that serve to maintain their vertical alignment. The grid can be fabricated to any size. *Rolock Inc.*

For more data insert No. 51 on postcard p. 365

ZEWO

SENSITIVE UNIVERSAL BENCH RADIAL DRILL PRESS

Drills at ANY angle or position of arm



For drilling, tapping, light profiling.

½" capacity; 1/3 h.p. motor; 4 speeds: 840, 1200, 2400, 3600 r.p.m.; weight, 440 lbs.

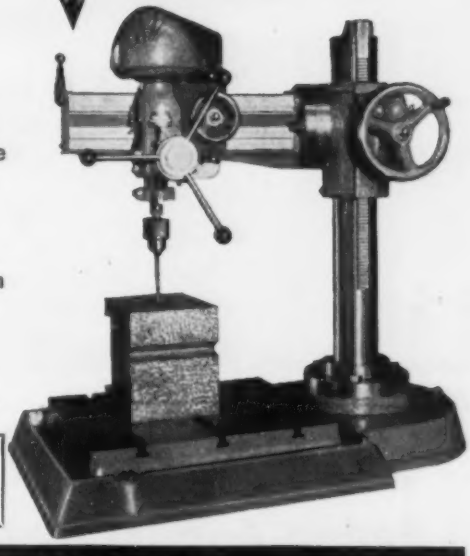
Max. Distance Spindle Center to Column—21"

Max. Distance Chuck Nose to Base—16½"

Greatest accuracy. Rugged. Free of vibration. Precision ball bearing mounted.

Tilts to any angle up to 90° in either position

Arm Swings to Any Position



LATEST FEATURES:

- Vertical Adjustment
- Horizontal Adjustment
- Graduation for Tilting Angle
- Spindle Adjustment
- Precision Finish
- Hand Scraped
- Column and Spindle Precision Ground

Dealers' Inquiries Invited.

Write for FREE illustrated Bulletin.

LIBERAL RENTAL TERMS ON TOOL ROOM AND PRODUCTION MACHINERY

Nationally Distributed by

CAPITOL MACHINERY CORP.

197-199 MOTT ST. Phone WOrth 4-7615 NEW YORK 12, N. Y.

Is Your Plant "Well Informed"?

★ Keep your *entire* plant abreast of the latest developments in the Metalworking industry by distributing extra copies of THE IRON AGE to all department heads.

★ An extra subscription or two will make the vast storehouse of information provided each week in THE IRON AGE available to many additional employees in your organization.

Additional subscriptions $8 per year

Write: CIRCULATION MANAGER

THE IRON AGE

100 East 42nd St., New York 17, N. Y.

OLSON

MANUFACTURING COMPANY

100 PRESCOTT ST., WORCESTER 5, MASS.

Representatives: New York • Philadelphia

Screw Machine Products since 1913

1/8" to 2 5/8" CAPACITY

STEEL • BRASS • ALUMINUM

QUALITY . . . . . DEPENDABILITY . . . . . EXPERIENCE

SUPERSTRONG-

A Perfect Answer to ALL of Your Shipping Needs

The SUPERSTRONG line is a complete line. No matter what type of product you wish to ship, there is a SUPER-STRONG container that can do the job for you.

WIREBOUND BOXES AND CRATES
Veneer or resawn material bound with steel wire, giving adequate protection with lighter container weight.

FRUIT AND VEGETABLE CRATES
All types of wirebound and wooden boxes and crates for fruits and vegetables.

WOODEN BOXES AND CRATES
Recommended for export handling and unusual shipping conditions requiring maximum protection.

PALLETS
Hardwood pallets, reusable and expendable types.

CORRUGATED BOXES
All types of corrugated fiber containers.

WOODEN BEVERAGE CASES
Greater protection at lowest per trip cost.

STARCH TRAYS
Starch, enrober and dipping trays.

SHIPPING SUPERSTRONG CONTAINERS

RATHBORNE, HAIR and RIDGWAY BOX CO.

1440 WEST 21st PLACE • CHICAGO 8, ILLINOIS

Basic Changes in Steel Controls May Come Soon

Steel producers and defense heads may compromise . . . OPS ruling will boom conversion market . . . Some consumers find windfall in rejects . . . Ingot rate moves higher again.

Basic changes may soon be made in the Controlled Materials Plan. National Production Authority may alter the plan as a result of suggestions which will come from steel industry advisory people soon. These suggestions will reflect studies of steel officials who helped work out both World War II CMP and the present one.

Fact is CMP isn't operating as smoothly as defense officials had hoped. In recent weeks they've been disappointed at the slowness with which distribution of steel has settled down into the right channels. Because of this, criticism from steel users and steelmakers has been mounting.

Compromise — Defense heads and steel executives discussed this—plus the need for more steel in the first quarter of next year—in Washington last week. Unless distribution of available steel improves in the first quarter, higher ingot output won't mean a corresponding increase in finished steel for more urgent industrial needs.

Some steel people still strongly believe that defense and urgent military needs should be the only items under control. But high defense officials insist that overall controls are needed. They have indicated they will stick to this stand. So steel people hope that by suggesting changes in CMP better use of available steel will be the result.

Tight Rope — Major trouble stems from the divided economy—guns and butter. In order to keep the civilian economy from cracking and yet fill military needs, a lot of tight rope walking has been necessary. So far the rope has baffled the walkers. The result: Allocations of materials have not always reflected practical conditions.

Improvement is on the way—if the Defense Production Authority analyzes its actions and acts on advice it will get from people who know the steel problem forward and backward. This means better screening of claimant agencies' demands. It also means tougher decisions as to who should get what steel and how much.

Tough Question—NPA is going to be asked a lot of embarrassing questions in about 2 weeks—unless promised order cancellations show up.

For example, one big plate consumer has been unable to book 35 pct of its CMP plate tickets for the fourth quarter. It was assured by both NPA and Petroleum Administration for Defense that mill space would open up as a result of cancellations forced by cutback allotments. Other manufacturers were also relying on cancellations.

As yet, there is no sign of significant tonnage having been cancelled. When and if it is, there will be a terrific scramble for open space created on mill schedules. Producers are fearful this will disrupt production schedules—and that lead time won't mean too much.

Conversion Boom—Last doubts about the future status of steel conversion have been removed. Office of Price Stabilization has decided additional conversion (above that during base period) is a legitimate cost and may be added to ceiling prices. Allowable conversion cost may not be more than double regular mill price of steel.

This will light a terrific fire under the already-hot conversion market. In fact it already has. One automaker worked out three new steel conversion arrangements last week.

How It Works—Since the automaker needs cold-finished bars instead of sheet, ingots aren't involved. The steel producer is merely asked to ship hot-rolled bars to a cold finisher who turns out the cold-finished bars.

This is hardly a permanent answer to the cold-finished bar problem. Several steel users quite frankly told THE IRON AGE that the hot-rolled tonnage now going to cold finishers will undoubtedly lead to a shortage of hot-rolled bars in the first quarter of '52.

Using Rejects—Some steel consumers whose specifications aren't too exacting are getting a windfall by using rejects. One steel company which normally scraps one or two ingots from each heat of steel received an offer to buy them.

Although both parties know this steel isn't up to snuff, it has been converted into hot-rolled bars. It is believed that 40,000 tons of steel that would normally be rejected have been used for agricultural applications alone. For parts where little stress is involved it has been found quite satisfactory.

Ingot Rate Up — Steelmaking operations this week are scheduled at 102.5 pct of rated capacity, up half a point from the previous week.

What's YOUR need in Alloy Steel Forgings?

We produce them in Tool, Die, Stainless SAE, or NE Steels -Any Application!

Write for New Booklet:

SMOOTH HAMMERED FORGINGS

Full information on the complete line of FCC Smooth Hammered Forgings . . . Rings, Hubs, Discs, Sleeves and other Forged Shapes; Intricate Shapes, Forgings for Hot Work Tools, etc.

Get Your Copy—Write for it Today

ADDRESS DEPT. IA-22

BROAD experience—over a period of many years—in forging tool and die blanks for almost every conceivable hot-work application has fitted our Forging and Casting Division to deal expertly with any problems that may arise in this exacting field.

Regardless of the kind of work to be done or material to be worked, we are equipped to furnish you with correctly made forgings of hot-work steel that will give you the utmost in effective performance.

Any Allegheny Ludlum field representative can give you further particulars; or get your copy of our booklet on "Smooth Hammered Forgings" (see description at left).

● Allegheny Ludlum Steel Corporation, Forging and Casting Division, Wanda and Jarvis Avenues, Detroit 20, Michigan.

For complete MODERN Tooling, call

Allegheny Ludlum

W&D 3669

AL FINE TOOL STEELS SINCE 1854

Market Briefs

shutdown—Lack of steel has shut down operations of the Vulcan Rivet & Bolt Co., Birmingham. Shortage is blamed principally on the recent Birmingham Southern R.R. Co. strike that forced Tennessee Coal, Iron & Railroad Co. to reduce production. Stockpiles were used up during the strike when Vulcan's September allotment from T.C.I.—about 90 pct of its supplies—failed to arrive. Date for reopening depends on when sufficient steel is received for uninterrupted production.

resumes production — Ending a week's shutdown due to "inability to obtain sheet bar at the proper price," Whitney-Apollo Steel Co., Apollo, Pa., resumed production last Monday. The shutdown idled 650 workers. The company produces hot rolled and galvanized sheets.

gas grows — Natural gas companies gained 520 industrial consumers during the year ending July 1, a report by the Federal Power Commission shows. Total industrial consumers numbered 34,991. During the year industry bought nearly $24 million worth, 22 pct over the previous year.

fast freight—Ten tons of urgently needed steel desks were recently moved from Cincinnati to Castle Air Force Base, Merced, Calif., on the same day. Trailmobile trailers delivered the Globe-Wernicke desks to a waiting Globemaster II, which flew them to California non-stop.

joint jeeps—Ford Motor Co. of Canada will build jeeps for the Canadian Army with the permission and technical advice of Willys-Overland Motors, Inc., original manufacturers and patent holders of the vehicle. Willys will furnish blueprints, specifications and parts to aid Ford of Canada in tooling up.

facilities expanded — Production of Electroshield, American Cladmetals Co.'s specialty metal, will be quadrupled in 1952. The firm is increasing its capacity to meet defense requirements for the metal, widely used to shield electronic equipment from interference.

gears down—Gear production declined in August 4.2 pct from the July rating. August index is estimated by American Gear Manufacturers Association at 564.2 (1935-39=100).

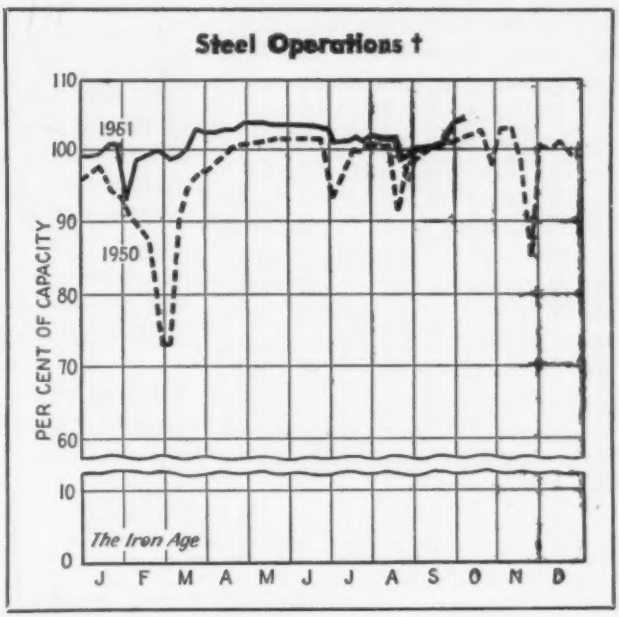
blown out — Duquesne blast furnace No. 4 of U. S. Steel Co., was blown out Sept. 24 for repairs.

push seaway—New drive for congressional approval of the controversial St. Lawrence seaway is under way in Congress. Spurred by Canada's recently-announced intention of "going it alone" if U. S. continues to delay, Rep. John A. Blatnik, D., Minn., is backing a new bill for joint construction of the $818,000,000 seaway. Similar bills have been voted down in committee this year.

trouble, trouble — Climaxing a series of strikes and slowdowns over incentives, begun last March, Youngstown Sheet & Tube Co.'s Brier Hill openhearth shop closed early this week. Shutdown became necessary due to blooming mill slowdowns. Other departments including the cold and hot strip mills and No. 1 seamless mill also have been hit. Openhearth shop at Campbell works continues to operate.

sulfur short — Government allocation of sulfur is being urged at the Capitol by John C. Carrington, of Freeport Sulphur Co. He says industry stockpiles are at a dangerously low level of a 6-month supply, in contrast to the usual 2-year supply of prewar years.

tungsten duty—Suspension of the $8-per-ton import duty on tungsten for 2 years has been approved in Washington by the House Ways and Means Committee. Under the terms of the bill, the duty would go back into force any time in the 2-yr period the White House declares the emergency over or the domestic price falls below $63 per ton for 20 days.



District Operating Rates—Per Cent of Capacity †

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	West	Buffalo	Cleveland	Detroit	Wheeling	South	Ohio River	St. Louis	East	Aggregate
Sept. 23	99.0	105.0	102.0*	101.0	102.0	104.0	94.5*	105.0*	104.0*	104.0	96.0	86.0	117.0	102.0
Sept. 30	99.0	106.0	93.0	101.0	104.0	104.0	101.0	104.0	104.0	108.0	92.0	86.0	126.0	102.5

† Beginning Jan. 1, 1951, operations are based on annual capacity of 104,229,650 net tons.
* Revised.

Lead, Zinc Ceilings 2¢ Higher

OPS sets zinc at 19½¢, lead at 19¢ on both imports and U. S. sales . . . Release another 30,000 tons of stockpile copper . . . IMC copper and zinc quotas set—*By Bob Hatschek.*

Ceiling prices of both lead and zinc were boosted 2¢ per lb early this week. Main purpose of the move is to bring about increased domestic production of the two short metals. Office of Price Stabilization simultaneously slapped ceilings of 19.5¢ and 19.0¢ on imported zinc and lead, respectively, thus aligning domestic and import prices for these metals.

The natural industry question following this action is: Will OPS increase the domestic copper ceiling to match the import ceiling? This would of course eliminate the dual price confusion and increase domestic output of copper. However, the government has made no indication that such a move is even under consideration despite the fact that there have been many requests from the copper industry to this effect.

Another Stockpile Withdrawal—The White House has authorized the release of an additional 30,000 tons of copper from the national stockpile, illustrating the severity of the shortage. Office of Defense Mobilization gives strikes, both here and in Chile, as the reason for the action. The first withdrawal, about 25,000 tons, must be replaced by next June but no replacement date was set for this latest release.

MONTHLY AVERAGE PRICES

The average prices of the major nonferrous metals in September based on quotations appearing in THE IRON AGE, were as follows:

	Cents Per Pound
Electrolytic copper, Conn. Valley	24.50
Lake Copper, delivered	24.625
Straits tin, New York	$1.03
Zinc, East St. Louis	17.50
Zinc, New York	18.29
Lead St. Louis	16.80
Lead, New York	17.00

Allocations Set — Fourth quarter allocations of copper and zinc have been announced by the International Materials Conference. The U. S. is entitled to consume 367,150 tons of the copper and 251,000 tons of the zinc that is available to the free world during the last 3 months of 1951. These tonnages represent about half of the total available and are fairly close approximations of average domestic consumption in 1950. They represent increases over the average quarterly use for the first three quarters of this year.

Chile Ties Strings — Chile has reserved the right to sell 20 pct of the copper output of its large mines and all of the output of its small mines outside of the allocation system. This represents about 25,000 tons of copper and could throw the system out of kilter but Chile has promised to give careful consideration to the recommendations of the committee.

Probably the main reason for the Chilean reservation is the fact that no attempt was made at setting either price ceilings or floors as was done in the case of tungsten and molybdenum. Chile can obtain much higher prices in other world markets than she can from a U. S. import ceiling of 27.5¢ per lb, a situation which has been one of the contributing factors in the U. S. copper shortage.

Shaky Basis — Whether or not the system pans out is largly dependent on the good faith of the member nations. Another point that adds to the uncertainty is that some of the supplying countries have not established controls to make the scheme effective. On the whole, however, everyone is pretty well pleased with the arrangements and they certainly cannot hurt our position and may very well go a long way toward pulling us out of the current shortage, though National Production Authority predicts a duration of at least 4 years for the copper shortage.

Lead Position—Washington reports that demand for domestic primary lead outstrips an initial available supply of 28,000 tons by 69,000 tons. The situation has been worsened by a reduction in this supply to 19,000 tons because of labor difficulties. To help alleviate this, NPA has been authorized to distribute 6000 to 7000 tons of lead during the last 4 months of the year which was to have gone into the stockpile. In other words, no new lead will go into the stockpile in the last third of 1951.

According to the report, about 25,000 tons of soft primary lead will be available for allocation in October and the allotments are to be made shortly.

NONFERROUS METAL PRICES

	Sept. 26	Sept. 27	Sept. 28	Sept. 29	Oct. 1	Oct. 2
Copper, electro, Conn.	24.50	24.50	24.50	24.50	24.50	24.50
Copper, Lake delivered	24.625	24.625	24.625	24.625	24.625	24.625
Tin, Straits, New York	$1.03	$1.03	$1.03	....	$1.03	$1.03*
Zinc, East St. Louis	17.50	17.50	17.50	17.50	17.50	19.50
Lead, St. Louis	16.80	16.80	16.80	16.80	16.80	18.80

*Tentative

Note: Quotations are going prices.

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt. frt. allowed)

Flat Sheet: 0.188 in., 2S, 3S, 30.1¢; 4S, 61S-O, 32¢; 52S, 34.1¢; 24S-O, 24S-OAL, 32.9¢; 75S-O, 75S-OAL, 39.9¢; 0.081 in., 2S, 3S, 31.2¢; 4S, 61S-O, 33.5¢; 52S, 35.6¢; 24S-O, 24S-OAL, 34.1¢; 75S-O, 75S-OAL, 41.3¢; 0.032 in., 2S, 3S, 32.9¢; 4S, 61S-O, 37.1¢; 52S, 39.3¢; 24S-O, 24S-OAL, 41.7¢; 75S-O, 75S-OAL, 52.2¢.

Plate ¼ in. and heavier: 2S, 3S-F, 28.3¢; 4S-F, 30.2¢; 52S-F, 31.3¢; 61S-O, 30.3¢; 24S-O, 24S-OAL, 32.4¢; 75S-O, 75S-OAL, 38.8¢.

Extruded Solid Shapes: Shape factors 1 to 5, 26.2¢ to 74.5¢; 12 to 14, 36.9¢ to 89¢; 24 to 26, 39.6¢ to $1.16; 36 to 38, 47.2¢ to $1.70.

Rod, Rolled: 1.5 to 4.5 in., 2S-F, 3S-F, 37.5¢ to 42.5¢; cold finished, 0.375 to 3 in., 2S-F, 3S-F, 40.5¢ to 45¢.

Screw Machine Stock: Rounds, 11S-T3, ⅛ to 11/32 in., 53.5¢ to 42¢; ⅜ to 1½ in., 41.5¢ to 39¢; 1 9/16 to 3 in., 38.5¢ to 36¢; 17S-T4 lower by 1.5¢ per lb. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in., 2S, 29.5¢ to 29¢; 52S, 48¢ to 35¢; 56S, 51¢ to 42¢; 17S-T4, 54¢ to 37.5¢; 61S-T4, 48.5¢ to 37¢; 75S-T6, 84¢ to 67.5¢.

Extruded Tubing, Rounds: 63-S-T-5, OD in in.: 1¼ to 2, 37¢ to 54¢; 2 to 4, 33.5¢ to 45.5¢; 4 to 6, 34¢ to 41.5¢; 6 to 9, 34.5¢ to 43.5¢.

Roofing Sheet, Flat: 0.019 in. x 28 in. per sheet, 72 in., $1.42; 96 in., $1.522; 120 in., $1.902; 144 in., $2.284. Gage 0.24 x 28 in., 72 in., $1.379; 96 in., $1.839; 120 in., $2.299; 144 in., $2.759. Coiled Sheet: 0.019 in. x 28 in., 28.2¢ per lb; 0.024 in. x 28 in., 26.9¢ lb.

Magnesium

(F.O.B. mill, freight allowed)

Sheet and Plate: FS1-O, ¼ in., 63¢; 3/16 in. 65¢; ⅛ in. 67¢; B & S Gage 10, 63¢; 12, 72¢; 14, 78¢; 16, 85¢; 18, 93¢; 20, $1.05; 22, $1.27; 24, $1.67. Specification grade higher. Base: 30,000 lb.

Extruded Round Rod: M, diam in., ¼ to 0.311 in., 74¢; ½ to ¾ in., 57.5¢; 1¼ to 1.749 in., 53¢; 2½ to 5 in., 48.5¢. Other alloys higher. Base Up to ¾ in. diam, 10,000 lb; ¾ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes, Rectangles: M. In weight per ft, for perimeters less than size indicated, 0.10 to 0.11 lb, 3.5 in., 62.3¢ 0.22 to 0.25 lb, 5.9 in., 59.3¢ 0.50 to 0.59 lb, 8.6 in., 56.7¢; 1.8 to 2.59 lb, 19.5 in., 53.3¢; 4 to 6 lb, 28 in., 49¢. Other alloys higher. Base, in weight per ft of shape: Up to ½ lb, 10,000 lb, ½ to 1.30 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ in. to 5/16, $1.40; 5/16 to ⅜, $1.26; ½ to ⅝, 93¢; 1 to 2 in., 76¢; 0.165 to $0.219, ⅝ to ¾, 61¢; 1 to 2 in., 57¢; 3 to 4 in., 56¢. Other alloys higher. Base, OD in in.: Up to 1½ in., 10,000 lb; 1½ in. to 3 in., 20,000 lb; 3 in. and larger, 30,000 lb.

Titanium

(10,000 lb base, f.o.b. mill)

Commercially pure and alloy grades: Sheet and strip, HR or CR, $15; Plate, HR, $12; Wire, rolled and/or drawn, $10; Bar, HR or forged, $6; Forgings, $6.

Nickel and Monel

(Base prices, f.o.b.. mill)

	"A" Nickel	Monel
Sheets, cold rolled	77	60½
Strip, cold-rolled	83	63½
Rods and bars	73	58½
Angles, hot-rolled	73	58½
Plates	75	59½
Seamless tubes	106	93½
Shot and blocks	..	53½

Copper, Brass, Bronze

(Freight prepaid on 200 lb)

	Sheet	Rods	Extruded Shapes
Copper	41.68	....	41.28
Copper, h-r	....	37.53	....
Copper, drawn	....	38.78	....
Low brass	39.67	39.36	....
Yellow Brass	38.28	37.97	....
Red brass	40.14	39.83	....
Naval brass	43.20	37.26	38.52
Leaded copper	....	41.58	....
Com'l bronze	41.13	40.82	....
Mang. bronze	46.92	40.81	42.37
Phos. bronze	61.07	61.32	....
Muntz metal	41.18	36.74	37.99
Ni silver, 10 pct	49.82	52.04	....

PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed	19.00
Aluminum pig	18.00
Antimony, American, Laredo, Tex.	42.00
Beryllium copper, 3.75-4.25% Be	$1.56
Beryllium aluminum 5% Be, Dollars per lb contained Be	$69.00
Bismuth, ton lots	$2.25
Cadmium, del'd	$2.55
Cobalt, 97-99% (per lb)	$2.40 to $2.47
Copper, electro, Conn. Valley	24.50
Copper, Lake, delivered	24.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$200
Lead, St. Louis	18.80
Lead, New York	19.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb	24.50
Magnesium, sticks, 100 to 500 lb	42.00 to 44.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$215-$221
Nickel electro, f.o.b. N.Y. warehouse	59.58
Nickel oxide sinter, at Copper Cliff, Ont., contained nickel	52.75
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$90 to $93
Silver, New York, cents per oz.	90.16
Tin, New York	$1.03
Titanium, sponge	$5.00
Zinc, East St. Louis	19.50
Zinc, New York	20.29
Zirconium copper, 50 pct	$6.20

REMELTED METALS

Brass Ingot

(Cents per lb, delivered carloads)

85-5-5-5 ingot	
No. 115	27.25
No. 120	26.75
No. 123	26.25
80-10-10 ingot	
No. 305	32.25
No. 315	30.25
88-10-2 ingot	
No. 210	40.00
No. 215	38.50
No. 245	33.50
Yellow ingot	
No. 405	23.25
Manganese bronze	
No. 421	29.50

Aluminum Ingot

(Cents per lb, 10,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper, max.	20.6
0.60 copper, max.	20.4
Piston alloys (No. 122 type)	21.2
No. 12 alum. (No. 2 grade)	19.5
108 alloy	20.6
195 alloy	20.8
13 alloy	20.8
ASX-679	20.5

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95-97½%	18.00
Grade 2—92-95%	17.75
Grade 3—90-92%	17.25
Grade 4—85-90%	16.50

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, freight allowed, 500 lb lots)

Copper	
Cast, oval, 15 in. or longer	37.84
Electrodeposited	33⅜
Flat rolled	38.34
Forged ball anodes	43
Brass, 80-20	
Cast, oval, 15 in. or longer	34¾
Zinc, oval	26½
Ball anodes	25½
Nickel 99 pct plus	
Cast	76.00
Rolled, depolarized	77.00
Cadmium	$2.80
Silver 999 fine, rolled, 100 oz lots, per troy oz, f.o.b. Bridgeport, Conn.	97½

Chemicals

(Cents per lb, f.o.b. shipping points)

Copper cyanide, 100 lb drum	63
Copper sulfate, 99.5 crystals, bbl.	12.85
Nickel salts, single or double, 4-100 lb bags, frt. allowed	20½
Nickel chloride, 375 lb drum	27½
Silver cyanide, 100 oz lots, per oz	67¼
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc cyanide, 100 lb drum	47.7

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add ⅛¢ per lb for shipments of 20,000 to 40,000 lb; add 1¢ for more than 40,000 lb)

	Heavy	Turnings
Copper	21½	20¾
Yellow Brass	19¼	17⅞
Red brass	20½	19⅝
Comm. bronze	20½	19⅝
Mang. bronze	18½	17⅝
Brass rod ends	18⅝	....

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	19.25
No. 2 copper wire	17.75
Light copper	16.50
Refinery brass	17.25*
Radiators	14.75

* Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	19.25
No. 2 copper wire	17.75
Light copper	16.50
No. 1 composition	18.50
No. 1 comp. turnings	18.25
Rolled brass	15.50
Brass pipe	16.50
Radiators	14.75
Aluminum	
Mixed old cast	9.75
Mixed new clips	11.00
Mixed turnings, dry	9.50
Pots and pans	9.25

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	18⅝—19⅛
No. 2 heavy copper and wire	17⅛—17⅝
Light copper	16 —16½
New type shell cuttings	16 —16½
Auto radiators (unsweated)	14⅛—14⅝
No. 1 composition	18 —18½
No. 1 composition turnings	17⅝—18
Unlined red car boxes	16½—17⅛
Cocks and faucets	15½—16
Mixed heavy yellow brass	12 —12½
Old rolled brass	15 —15½
Brass pipe	16 —16½
New soft brass clippings	16 —16⅛
Brass rod ends	15½—16
No. 1 brass rod turnings	15 —15½

Aluminum

Alum. pistons and struts	6½— 7⅛
Aluminum crankcases	7½— 8
2S aluminum clippings	10⅛
Old sheet and utensils	7½— 8
Borings and turnings	5 — 6
Misc. cast aluminum	7½— 8
Dural clips (24S)	10 —11

Zinc

New zinc clippings	12¼—12½
Old zinc	9 — 9¼
Zinc routings	5¾— 6
Old die cast scrap	5¾— 6

Nickel and Monel

Pure nickel clippings	35 —36
Clean nickel turnings	35 —36
Nickel anodes	35 —36
Nickel rod ends	35 —36
New Monel clippings	28 —29
Clean Monel turnings	20 —21
Old sheet Monel	28 —29
Nickel silver clippings, mixed	13 —14
Nickel silver turnings, mixed	12 —13

Lead

Soft scrap, lead	14 —14½
Battery plates (dry)	9½—10

Magnesium

Segregated solids	15 —16
Castings	14 —15

Miscellaneous

Block tin	35 —90
No. 1 pewter	60 —65
No. 1 auto babbitt	48 —50
Mixed common babbitt	16¼—16⅜
Solder joints	23 —24
Siphon tops	48 —50
Small foundry type	20½—21
Monotype	13¼—13⅜
Lino. and stereotype	17½—18
Electrotype	15 —15⅛
Hand picked type shells	8¾— 9
Lino. and stereo. dross	8¾— 9
Electro. dross	5 — 5¼

Smooth Scrap Distribution Vital

Will assume more importance as winter squeezes supply . . . NPA allocations must go to right place at the right time . . . Scrap drive returns seen going straight to furnace.

Distribution of scrap will be as important as collection to maintain the top steelmaking rate this winter. NPA's allocations system must stand the strain of heavier responsibilities.

Even if enough scrap is available on an overall basis, NPA must see that it gets to the right place at the right time. A good many scrap and steel people feel that some shutdowns of furnaces are inevitable but these will be spotty, not affecting production appreciably.

NPA's allocations difficulties will multiply as cold makes scrap scarcer. The system has been gaining experience in the past months and has shown vigor in saving some mills from shutdown with emergency shipments. It will need all its experience.

Gist of reports made at the Washington scrap drive committee meeting last week was that new tonnages resulting from the industry campaign are going directly to the furnace. Consumer stocks have increased only by about a half-day in the past 3 months despite the scrap drive.

The meeting brought out that average scrap inventories had risen from 1.2 months as of July 1 to about 1.4 months as of Sept. 1. Some areas are critical and some comparatively well off. Ohio Valley, which has been helped before by NPA super priority allocations, is still in the saddest shape.

Government estimates of stockpiles figure in scrap that is not immediately available for the furnace. Industry now just counts what's ready.

Although scrap men often say that results of the dormant scrap campaign are yet to be felt substantially, the turning point may soon come. In any case, tonnage will come in over many months and it may be difficult to gage results.

Pittsburgh—The scrap picture is growing darker here. A leading mill that had 15 days' supply several weeks ago is down to less than 4 day's inventory. OPS is reported to have decided to lump No. 1 and No. 2 steel into one to sell at the prevailing No. 1 price. OPS also is said to have decided to reduce the premium on No. 20 grade from $2 to $1, and an No. 21 from $4 to $2. NPA has issued a "stop" order against ten consumers, most of them relatively small, prohibiting receipt of scrap until their inventories drop below 25 days.

Chicago — According to some sources the scrap market here is behaving erractically. Items not being allocated do not seem in too great demand. One small mill is out of the market. Another is taking only from its customers and only certain grades. Others are not taking borings and turnings from dealers while some are backing away from high springboards. Heavy melting grades, railroad and industrial scrap are still in extremely great demand.

Philadelphia—Allocations to local mills are still copious but much scrap is being lost to the West via the upgrading path. Some members of the trade deny that upgrading is taking place but they will admit that material is being poorly prepared—which adds up to the same thing. This is hurting the local mills and one broker is willing to bet that no mill in the area has better than a 2-week supply.

New York—The expected OPS order marrying the openhearth grades caused speculation on what it would do to upgrading. Not too much was the general opinion. No. 1 is ducking the market and won't be encouraged to reappear. Now that some smaller producers have withdrawn from the market at request of NPA, big mills will stand a better chance at collection.

Detroit—The Detroit scrap market is very quiet. Trade sources indicate that reduced auto output is already reflected in the smaller volume of scrap generated. While there have been reports of large tonnages of scrap turned up in current scrap drives, this tonnage is not yet available in dealers' yards.

Cleveland—With stamping activities down in many large plants, it's only natural, one dealer claims, that scrap will become more scarce. He doesn't feel a price change will make much difference because scrap just isn't around.

St. Louis—Some rumors were circulating that OPS would soon change openhearth pricing setup. Auto-wreckers are making increasingly important contributions to the scrap drive.

Birmingham—The scrap situation is unchanged. Heavy melting and cast grades are coming into the district in dribbles but not enough to fill orders dealers and brokers have on hand. Two mills, one at Anniston and the other an electric furnace at Birmingham, report allotments granted them have eased the acute shortage.

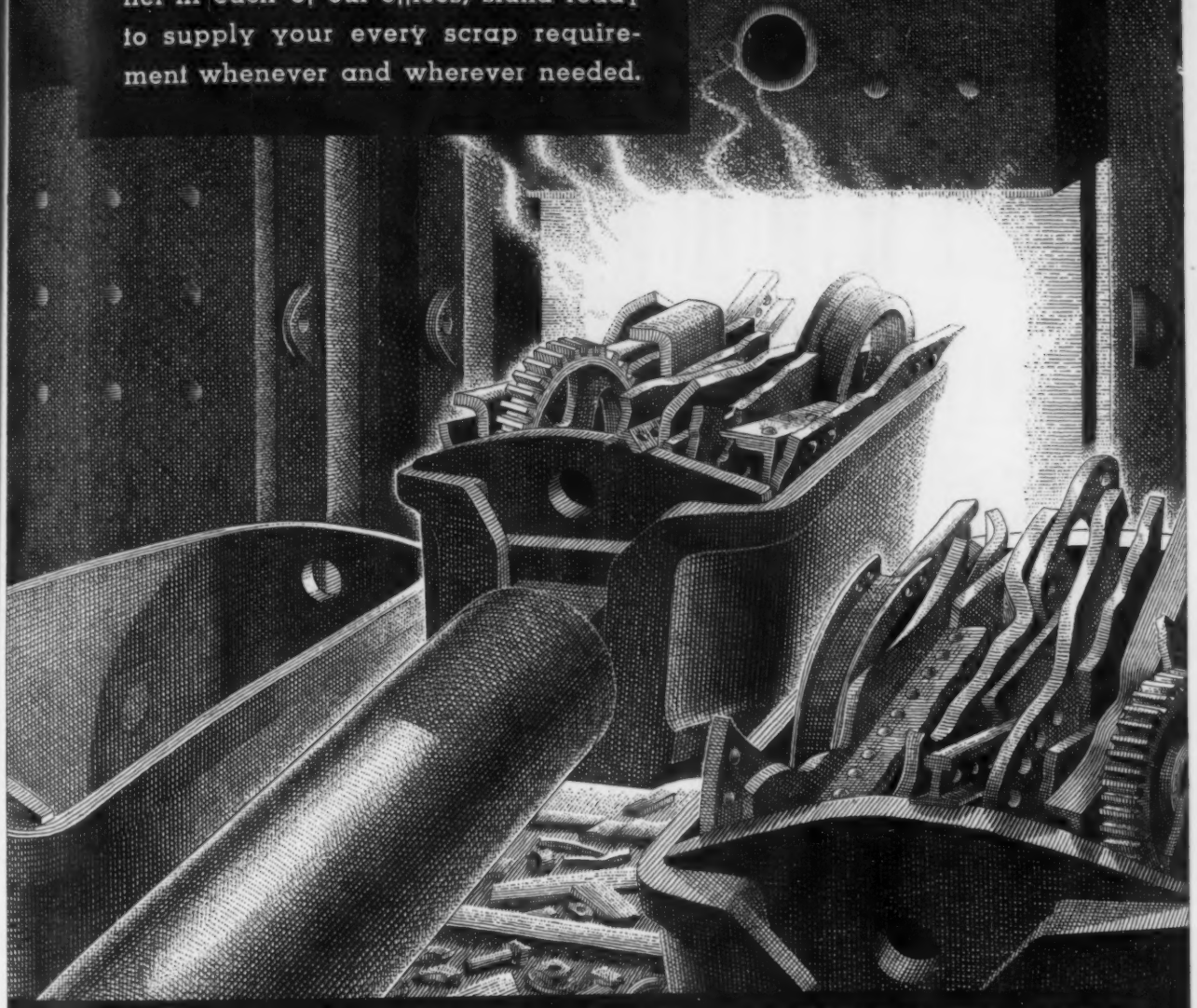
Cincinnati—Demand for all grades continues with plenty moving but not in sufficient quantities to keep up with demand. Attempts to get scrap through plant drives has helped but most quantities are small. Auto wreckers here are cutting more scrap than they have in a long time. They are probably making the greatest significant contribution to the drive. Stockpiles are very low.

Boston—A slight decrease in activity has been noted here for the first time in many weeks. However, this is believed to be more or less expected as scrap becomes harder to obtain. Cast continues to move in fair volume.

Buffalo—With from 30 to 60 days of scrap on hand mills in this area are nevertheless concerned about the winter steelmaking outlook. This may sound strange to other centers with far less scrap on the ground but Buffalo scrap receipts are extremely sensitive to cold weather. Supply waterways freeze. Mills expect the real squeeze to come in January or February.

SCRAP *at your Service!*

The facilities and experienced personnel in each of our offices, stand ready to supply your every scrap requirement whenever and wherever needed.



LURIA BROTHERS AND COMPANY, INC.

CONSULT OUR NEAREST OFFICE FOR THE PURCHASE AND SALE OF SCRAP

PLANTS
LEBANON, PENNA.
READING, PENNA.
DETROIT (ECORSE), MICHIGAN
MODENA, PENNA.
PITTSBURGH, PENNA.
ERIE, PENNA.

MAIN OFFICE
LINCOLN-LIBERTY BLDG.
Philadelphia 7, Penna.

OFFICES
BIRMINGHAM, ALA. Empire Building
BOSTON, MASS. Statler Building
BUFFALO, N. Y. Genesee Building
CHICAGO, ILLINOIS 100 W. Monroe St.
CLEVELAND, OHIO 1022 Midland Bldg.
DETROIT, MICHIGAN 2011 Book Building
HOUSTON, TEXAS 1114 Texas Av. Bldg.
LEBANON, PENNA. Luria Building
NEW YORK, N. Y. 100 Park Avenue
PITTSBURGH, PA. Oliver Building
PUEBLO, COLORADO 334 Colorado Bldg.
READING, PENNA. Luria Building
ST. LOUIS, MISSOURI 2062 Railway Exchange Bldg.
SAN FRANCISCO, CALIFORNIA Pacific Gas & Elec. Co. Bldg.

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Iron and Steel

SCRAP PRICES

(Maximum basing point prices, per gross ton, as set by OPS, effective Feb. 7, 1951. Shipping point and delivered prices calculated as shown below.)

Switching Charge (Dollars per gross ton) →	$0.99	.75	.53	.65	.75	.51	.75	.70	.75	.51	.75	.51	.76	.63	.65	.26	1.34	.79	.50	.20	.51	.20	.62	.47	.51	.51	.51	.98	.50	.43	.51	.33	.67	.66	.82	.99	.94
Basing Points →	Pittsburgh	Johnstown	Brackenridge	Butler	Midland	Monessen	Sharon	Youngstown	Canton	Steubenville	Warren	Weirton	Cleveland	Buffalo	Cincinnati	Middletown	Chicago	Claymont	Coatesville	Conshohocken	Harrisburg	Phoenixville	Sparrows Pt.	Bethlehem	Ashland, Ky.	Kokomo, Ind.	Portsmouth, O.	St. Louis	Detroit	Duluth	Kansas City	Birmingham	Alabama City	Atlanta	Minnesota	Houston	Los Angeles	Pittsburg, Cal.	Portland, Ore.	San Francisco	Seattle
GRADES **OPS No.**																																					
No. 1 heavy melting 1	$44.00		$44.00					$43.00					$42.50				$42.00						$41.00		$41.15			$40.00	$39.50	$39.00		$38.00	$37.00		$38.00			
No. 2 heavy melting 2	42.00		42.00					41.00					40.50				40.00						39.00		39.15			38.00	37.50	37.00		36.00	35.00		36.00			
No. 1 busheling 3	44.00		44.00					43.00					42.50				42.00						41.00		41.15			40.00	39.50	39.00		38.00	37.00		38.00			
No. 1 bundles 4	44.00		44.00					43.00					42.50				42.00						41.00		41.15			40.00	39.50	39.00		38.00	37.00		38.00			
No. 2 bundles 5	41.00		41.00					40.00					39.50				39.00						38.00		38.15			37.00	36.50	36.00		35.00	34.00		32.00			
Machine shop turnings 6	34.00		34.00					33.00					32.50				32.00						31.00		31.15			30.00	29.50	29.00		28.00	27.00		28.00			
Mixed borings and turnings 7	38.00		38.00					37.00					36.50				36.00						35.00		35.15			34.00	33.50	33.00		32.00	31.00		29.00			
Shovelling turnings 8	38.00		38.00					37.00					36.50				36.00						35.00		35.15			34.00	33.50	33.00		32.00	31.00		29.00			
Cast iron borings 10	38.00		38.00					37.00					36.50				36.00						35.00		35.15			34.00	33.50	33.00		32.00	31.00		29.00			
No. 1 chemical borings 26	41.00		41.00					40.00					39.50				39.00						38.00		38.15			37.00	36.50	36.00		35.00	34.00		32.00			
Forge crops 11	51.50		51.50					50.50					50.00				49.50						48.50		48.65			47.50	47.00	46.50		45.50	44.50		42.00			
Bar crops and plate 12	49.00		49.00					48.00					47.50				47.00						46.00		46.15			45.00	44.50	44.00		43.00	42.00		40.00			
Punchings and plate 14	46.50		46.50					45.50					45.00				44.50						43.50		43.65			42.50	42.00	41.50		40.50	39.50		37.50			
Electric furnace bundles 15	46.00		46.00					45.00					44.50				44.00						43.00		43.15			42.00	41.50	41.00		40.00	39.00		37.00			
Cut struct., plate, 3 ft and less 16	47.00		47.00					46.00					45.50				45.00						44.00		44.15			43.00	42.50	42.00		41.00	40.00		38.00			
Cut struct., plate, 2 ft and less 17	49.00		49.00					48.00					47.50				47.00						46.00		46.15			45.00	44.50	44.00		43.00	42.00		40.00			
Cut struct., plate, 1 ft and less 18	50.00		50.00					49.00					48.50				48.00						47.00		47.15			46.00	45.50	45.00		44.00	43.00		41.00			
Foundry steel, 2 ft and less 20	46.00		46.00					45.00					44.50				44.00						43.00		43.15			42.00	41.50	41.00		40.00	39.00		37.00			
Foundry steel, 1 ft and less 21	48.00		48.00					47.00					46.50				46.00						45.00		45.15			44.00	43.50	43.00		42.00	41.00		39.00			
Heavy trimmings 24	43.00		43.00					42.00					41.50				41.00						40.00		40.15			39.00	38.50	38.90		37.00	36.00		34.00			
No. 1 RR heavy melting RR 1	46.00		46.00					45.00					44.50				44.00						43.00		43.15			42.00	41.50	41.00		40.00	39.00		37.00			
Scrap rails, random lengths RR 14	48.00		48.00					47.00					46.50				46.00						45.00		45.15			44.00	43.50	43.00		42.00	41.00		38.00			
Scrap rails, 3 ft and less RR 16	51.00		51.00					50.00					49.50				49.00						48.00		48.15			47.00	46.50	46.00		45.00	44.00		42.00			
Scrap rails, 2 ft and less RR 17	52.00		52.00					51.00					50.50				50.00						49.00		49.15			48.00	47.50	47.00		46.00	45.00		43.00			
Scrap rails, 18 in. and less RR 18	54.00		54.00					53.00					52.50				52.00						51.00		51.15			50.00	49.50	49.00		48.00	47.00		45.00			
Rerolling rails RR 15	53.00		53.00					52.00					51.50				51.00						50.00		50.15			49.00	48.50	48.00		47.00	46.00		44.00			
Uncut tires RR 20	48.00		48.00					47.00					46.50				46.00						45.00		45.15			44.00	43.50	43.00		42.00	41.00		39.00			
Cut tires RR 21	51.00		51.00					50.00					49.50				49.00						48.00		48.15			47.00	46.50	46.00		45.00	44.00		42.00			
Cut bolsters and side frames RR 23	49.00		49.00					48.00					47.50				47.00						46.00		46.15			45.00	44.50	44.00		43.00	42.00		40.00			
RR specialties RR 24, 28, 29	51.00		51.00					50.00					49.50				49.00						48.00		48.15			47.00	46.50	46.00		45.00	44.00		42.00			
Solid steel axles RR 25	58.00		58.00					57.00					56.50				56.00						55.00		55.15			54.00	53.50	53.00		52.00	51.00		49.00			
No. 3 steel wheels RR 27	51.00		51.00					50.00					49.50				49.00						48.00		48.15			47.00	46.50	46.00		45.00	44.00		42.00			

Cast Scrap

(F.o.b. all shipping points)

Grades	OPS No.	
Cupola cast	1	$49.00
Charging box cast	2	47.00
Heavy breakable cast	3	46.00
Cast iron brake shoes	5	41.00
Stove plate	6	46.00
Clean auto cast	7	52.00
Unstripped motor blocks	8	43.00
Cast iron carwheels	9	47.00
Malleable	10	55.00
Drop broken mach'y. cast	11	52.00

Ceiling price of clean cast iron foundry runouts or prepared cupola drops is 75 pct of corresponding grade.

SWITCHING DISTRICTS—These basing points include the indicated switching districts: Pittsburgh; Bessemer, Homestead, Duquesne, Munhall. Cincinnati; Newport. St. Louis; Granite City, East St. Louis, Madison, and Federal, Ill. San Francisco; South San Francisco, Niles, Oakland. Claymont; Chester. Chicago; Garz.

SHIPPING POINT PRICES (Except RR scrap)—For shipping points within basing points, the ceiling shipping point price is the basing point price, less switching charge. The ceiling for shipping points outside basing points is the basing point price yielding the highest shipping point price, less the lowest established freight charge. Dock charge, where applicable, is $1.25 per gross ton except: Memphis, 95¢; Great Lakes ports, $1.50, and New England ports, $1.75. Maximum shipping point price on No. 1 heavy melting steel in New York City is $36.99 per gross ton with set differentials for other grades. Hudson and Bergen County, N. J., shipping point prices are computed from Bethlehem basing point. All New Jersey computations use all-rail transport. Ceiling need not fall below $32 per gross ton for No. 1 heavy melting steel, with set differentials for other grades. Cast scrap shipping point prices are given in table.

DELIVERED PRICES (RR scrap)—Ceiling on-line price of a RR operating in a basing point is the top in the highest priced basing point in which the RR operates. For off-line prices, RR's not operating in basing point, non-operating RR's, and RR scrap sold by someone other than a RR see text of order, THE IRON AGE, Feb. 8, 1951, p. 137-C.

DELIVERED PRICES (Except RR scrap)—Ceiling is the shipping point price plus actual freight charge, tax included. Dock charges, where applicable, are as above.

UNPREPARED SCRAP—Ceiling price is $8 a ton less than prepared base grades (No. 1 heavy & No. 1 RR heavy). Scrap suitable for compressing into No. 1 bundles is $6 less than No. 1 bundles; suitable for compressing into No. 2 bundles, $8 less than No. 2 bundles. For cast material requiring special preparation, price is breakable cast less preparation costs.

COMMISSIONS—Brokers are permitted a maximum of $1 per gross ton commission which must be separate on the bill.

ALLOY PREMIUMS—These alloy extras are permitted: Nickel; $1.25 may be added to price of No. 1 heavy for each 0.25 pct nickel between 1 and 5.25 pct. Molybdenum; $2 may be added to price of No. 1 heavy for molybdenum over 0.15 pct, $3 for content over 0.65 pct. Manganese; $4 may be added to price of No. 1 heavy or No. 1 RR heavy for content over 10 pct if scrap is in sizes over 8 x 12 x 24 in., $14 if less than 8 x 12 x 24 in. Manganese premium applicable only if sold for electric furnace use or on NPA allocation. Silicon: electric furnace and foundry grade adjustments are not applicable if silicon content is between 0.5 and 1.75 pct. Chromium: $1 may be added if scrap conforms to SAE 52100 analysis. Multiple Alloys; if scrap contains two premium alloy elements, total premium may not exceed ceiling premium for any one contained alloy.

RESTRICTONS ON USE—Ceiling prices on some scrap items may fluctuate with use by consumers. If some scrap is purchased for its established specialized use, the ceiling price set in the order stands. But if some special grades are purchased for other uses, the ceiling price charge shall be the price of the scrap grade being substituted. For example, the price established for Grade 28 (wrought iron) may be charged only when sold to a producer of wrought iron. Otherwise the ceiling price shall not exceed the ceiling price for the corresponding grade of basic openhearth. Restrictions on use are placed on the following grades: Chemical borings, wrought iron and rerolling rails, cupola cast, billet, bloom, and forge crops, Nos. 1 and 2 chemical borings. Ceiling prices on billet bloom and forge crops, alloy-free turnings, and heavy turnings may be charged only when shipped directly from industrial producer. NPA prohibits openhearth users from buying electric furnace grades, Nos. 11 through 18, foundry grades, Nos. 10 and 21 and cast grades, 1, 7, 9 and 11.

CEILING INTRANSIT PREPARATION CHARGES (Dollars per gross ton)

No. 1 heavy; No. 2 heavy; No. 1 RR heavy; No. 2 RR heavy; No. 1 busheling; No. 2 bundles; electric furnace bundles	$ 8.00
No. 1 bundles; briquetted turnings or cast iron borings; No. 1 RR sheet scrap	6.00
Crushing machine shop turnings	3.00
Bar crops and plate, cast steel, punchings and plate, cut structural and plate, 3 ft and under, foundry steel, 2 ft and under, wrought iron	10.00
Structural, plate scrap, 2 ft and less, foundry steel 1 ft and less	11.00
Structural and plate scrap, 1 ft and less	12.00
Rails, 3 ft & less; cut tires; cut bolsters & side frames	4.00
Rails, 2 ft & less	5.00
Rails, 18 in. & less	7.00

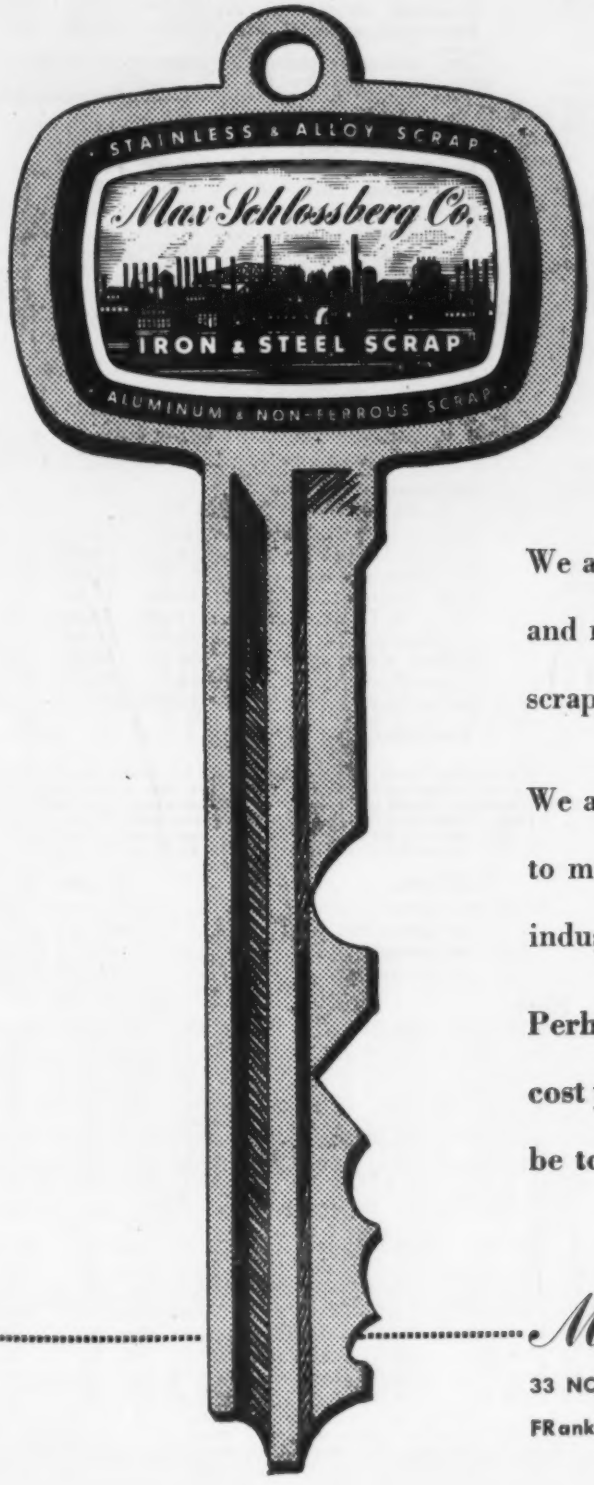
Hamilton, Ontario

(Consumers buying prices, del'd gross ton)

Hvy. melting steel	$35.00
No. 1 bundles	35.00
No. 2 bundles	34.50
Mechanical bundles	32.00
Mixed, steel scrap	31.00
Rails, remelting	35.00
Rails, rerolling	38.00
Bushelings	29.50
Bushelings, prepared new factory	33.00
Bushelings, unprepared new factory	28.00
Short steel turnings	28.00
Mixed borings, turnings	28.00
Cast scrap	58.00 to 60.00

The Key to . . .

Service and Dependability



We are brokers and dealers in ferrous and non-ferrous metals—both in scrap and semi-finished form.

We are today rendering efficient service to many of America's leading industrial scrap sources.

Perhaps we can help you, too. It will cost you nothing to inquire—it may be to your disadvantage—not to!

Max Schlossberg Co.

33 NORTH LASALLE STREET, CHICAGO 2, ILL.

FRanklin 2-0380

Comparison of Prices

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel: (cents per pound)	Oct. 2, 1951	Sept. 25, 1951	Sept. 18, 1951	Oct. 3 1950
Hot-rolled sheets	3.60	3.60	3.60	3.35
Cold-rolled sheets	4.35	4.35	4.35	4.10
Galvanized sheets (10 ga)	4.80	4.80	4.80	4.40
Hot-rolled strip	3.50	3.50	3.50	3.25
Cold-rolled strip	4.75	4.75	4.75	4.21
Plate	3.70	3.70	3.70	3.50
Plates wrought iron	7.85	7.85	7.85	7.85
Stains C-R strip(No. 302)	36.75	36.75	36.75	34.50
Tin and Ternplate: (dollars per base box)				
Tinplate (1.50 lb.) cokes.	$8.70	$8.70	$8.70	$7.50
Tinplate, electro (0.50 lb.)	7.40	7.40	7.40	6.60
Special coated mfg. ternes	7.50	7.50	7.50	6.35
Bars and Shapes: (cents per pound)				
Merchant bars	3.70	3.70	3.70	3.45
Cold finished bars	4.55	4.55	4.55	4.145
Alloy bars	4.30	4.30	4.30	3.95
Structural shapes	3.65	3.65	3.65	3.40
Stainless bars (No.302)	31.50	31.50	31.50	30.00
Wrought iron bars	9.50	9.50	9.50	9.50
Wire: (cents per pound)				
Bright wire	4.85	4.85	4.85	4.50
Rails: (dollars per 100 lb)				
Heavy rails	$3.60	$3.60	$3.60	$3.40
Light rails	4.00	4.00	4.00	3.75
Semifinished Steel: (dollars per net ton)				
Rerolling billets	$56.00	$56.00	$56.00	$54.00
Slabs, rerolling	56.00	56.00	56.00	54.00
Forging billets	66.00	66.00	66.00	63.00
Alloy blooms billets, slabs	70.00	70.00	70.00	66.00
Wire Rod and Skelp: (cents per pound)				
Wire rods	4.10	4.10	4.10	3.85
Skelp	3.35	3.35	3.35	3.15

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

Pig Iron: (per gross ton)	Oct. 2, 1951	Sept. 25, 1951	Sept. 18, 1951	Oct. 3 1950
No. 2 foundry, del'd Phila.	$57.77	$57.77	$57.77	$51.76
No. 2, Valley furnace	52.50	52.50	52.50	49.50
No. 2, Southern Cin'ti	55.58	55.58	55.58	52.58
No. 2, Birmingham	48.88	48.88	48.88	45.88
No. 2, foundry, Chicago†	52.50	52.50	52.50	49.50
Basic del'd Philadelphia	56.92	56.92	56.92	50.92
Basic, Valley furnace	52.00	52.00	52.00	49.00
Malleable, Chicago†	52.50	52.50	52.50	49.50
Malleable, Valley	52.50	52.50	52.50	49.50
Charcoal, Chicago	70.56	70.56	70.56	70.56
Ferromanganese‡	186.25	186.25	186.25	173.40

†The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡Average of U. S. prices quoted on Ferroalloy page.

Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$44.00*	$44.00*	$44.00*	$43.75
No. 1 steel, Phila. area	42.50*	42.50*	42.50*	38.50
No. 1 steel, Chicago	42.50*	42.50*	42.50*	39.75
No. 1 bundles, Detroit	41.15*	41.15*	41.15*	37.25
Low phos. Young'n	46.50*	46.50*	46.50*	46.25
No. 1 cast, Pittsburgh	49.00†	49.00†	49.00†	52.75
No. 1 cast, Philadelphia	49.00†	49.00†	49.00†	48.50
No. 1 cast, Chicago	49.00†	49.00†	49.00†	50.50

*Basing Pt. †Shipping Pt.
Not including broker's fee after Feb. 7, 1951.

Coke: Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75	$14.75	$14.75	$14.25
Foundry coke, prompt	17.75	17.75	17.75	16.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	24.50	24.50	24.50	24.50
Copper, Lake, Conn.	24.625	24.625	24.625	24.625
Tin, Straits, New York	$1.03†	$1.03	$1.03	$1.0575
Zinc, East St. Louis	19.50	17.50	17.50	17.50
Lead, St. Louis	18.80	16.80	16.80	15.80
Aluminum, virgin	19.00	19.00	19.00	19.00
Nickel, electrolytic	59.58	59.58	59.58	51.22
Magnesium, ingot	24.50	24.50	24.50	24.50
Antimony, Laredo, Tex.	42.00	42.00	42.00	32.00

†Tentative.

Composite Prices

Starting with the issue of May 12, 1949, the weighted finished steel composite was revised for the years 1941 to date. The weights used are based on the average product shipments for the 7 years 1937 to 1940 inclusive and 1946 to 1948 inclusive. The use of quarterly figures has been eliminated because it was too sensitive. (See p. 130 of May 12, 1949, issue.)

	Finished Steel Base Price	Pig Iron	Scrap Steel
Oct. 2, 1951	4.131¢ per lb.	$52.69 per gross ton	$43.00 per gross ton
One week ago	4.131¢ per lb.	52.69 per gross ton	43.00 per gross ton
One month ago	4.131¢ per lb.	52.69 per gross ton	43.00 per gross ton
One year ago	3.837¢ per lb.	46.61 per gross ton	40.67 per gross ton

	High	Low
1951	4.131¢ Jan. 2	4.131¢ Jan. 2
1950	4.131¢ Dec. 1	3.837¢ Jan. 3
1949	3.837¢ Dec. 27	3.3705¢ May 3
1948	3.721¢ July 27	3.193¢ Jan. 1
1947	3.193¢ July 29	2.848¢ Jan. 1
1946	2.848¢ Dec. 31	2.464¢ Jan. 1
1945	2.464¢ May 29	2.396¢ Jan. 1
1944	2.396¢	2.396¢
1943	2.396¢	2.396¢
1942	2.396¢	2.396¢
1941	2.396¢	2.396¢
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16
1939	2.35367¢ Jan. 3	2.26689¢ May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10
1932	1.89196¢ July 5	1.83910¢ Mar. 1
1929	2.31773¢ May 28	2.26498¢ Oct. 29

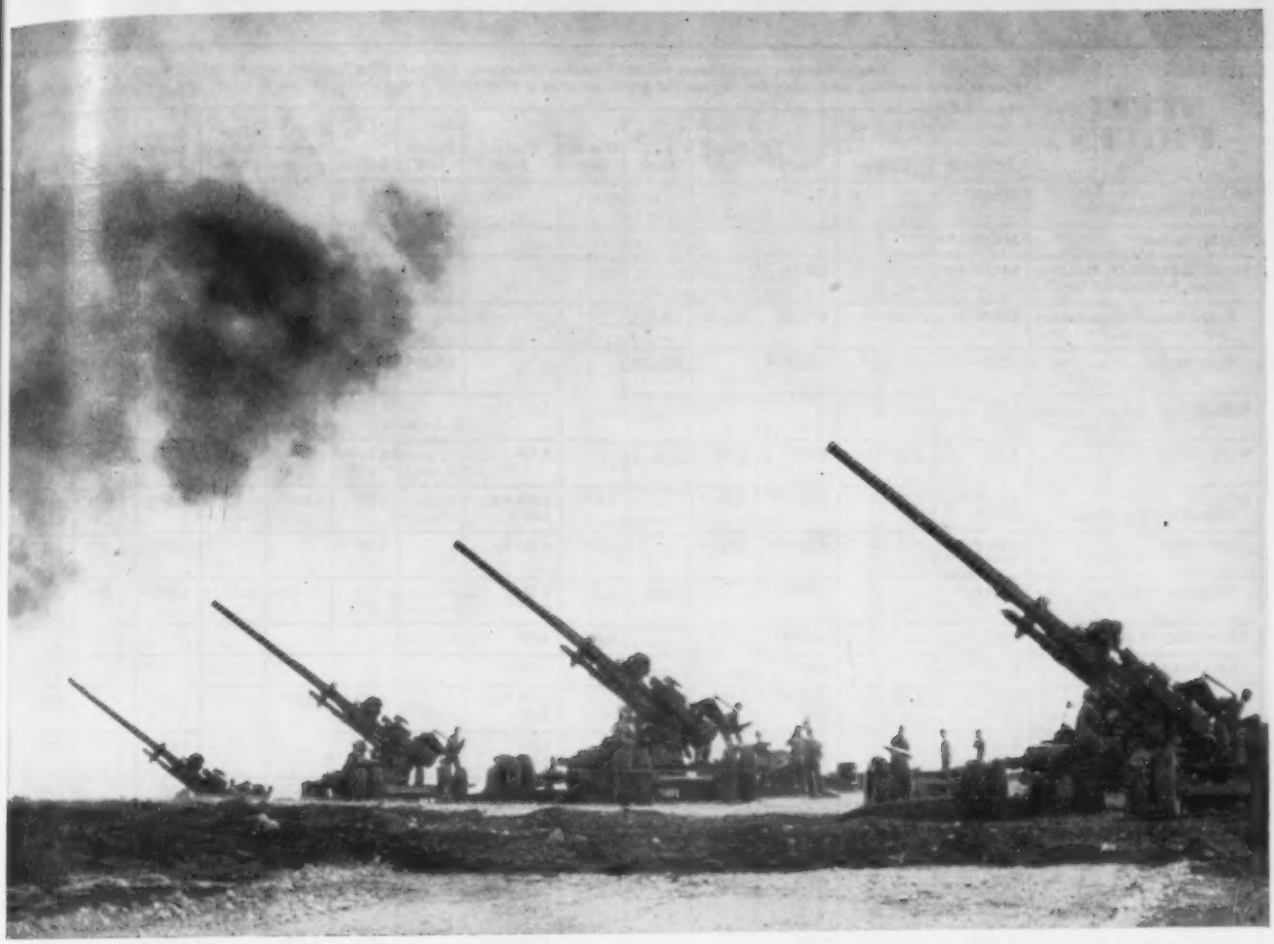
Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strips, representing major portion of finished steel shipment. Index recapitulated in Aug. 28, 1941, issue and in May 12, 1949.

	High	Low
1951	$52.69 Jan. 2	$52.69 Jan. 2
1950	52.69 Dec. 12	45.88 Jan. 3
1949	46.87 Jan. 18	45.88 Sept. 6
1948	46.91 Oct. 12	39.58 Jan. 6
1947	37.98 Dec. 30	30.14 Jan. 7
1946	30.14 Dec. 10	25.37 Jan. 1
1945	25.37 Oct. 23	23.61 Jan. 2
1944	$23.61	$23.61
1943	23.61	23.61
1942	23.61	23.61
1941	$23.61 Mar. 20	$23.45 Jan. 2
1940	23.45 Dec. 23	22.61 Jan. 2
1939	22.61 Sept. 19	20.61 Sept. 12
1938	23.25 June 21	19.61 July 6
1937	32.25 Mar. 9	20.25 Feb. 16
1936	19.74 Nov. 24	18.73 Aug. 11
1932	14.81 Jan. 5	13.56 Dec. 6
1929	18.71 May 14	18.21 Dec. 17

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High	Low
1951	$47.75 Jan. 30	$43.00 Feb. 7
1950	45.13 Dec. 19	26.25 Jan. 3
1949	43.00 Jan. 4	19.33 June 28
1948	43.16 July 27	39.75 Mar. 9
1947	42.58 Oct. 28	29.50 May 20
1946	31.17 Dec. 24	19.17 Jan. 1
1945	19.17 Jan. 2	18.92 May 22
1944	19.17 Jan. 11	15.76 Oct. 24
1943	$19.17	$19.17
1942	19.17	19.17
1941	$22.00 Jan. 7	$19.17 Apr. 10
1940	21.83 Dec. 30	16.04 Apr. 9
1939	22.50 Oct. 3	14.08 May 16
1938	15.00 Nov. 22	11.00 June 7
1937	21.92 Mar. 30	12.67 June 9
1936	17.75 Dec. 21	12.67 June 8
1932	8.50 Jan. 12	6.43 July 5
1929	17.58 Jan. 29	14.08 Dec. 8

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.



Official Army photo, released by Dept. of Defense

It takes plenty of **SCRAP** *...to be ready for one!*

Like these antiaircraft gunners, America is fast raising its sights . . . on production of all types of heavy artillery for defense. Big guns require enormous quantities of nickel-bearing steel, which in turn requires enormous quantities of scrap . . . a full ton of it for every two tons of new steel. Keeping this kind of scrap moving to the mills is an industry-wide job . . . and our No. 1 specialty.

when stainless is the question

ask **KLAFF** first

H. KLAFF & COMPANY, Inc.

Brokers, Converters & Dealers • Ostend & Paca Sts., Baltimore 30, Md. • 50 Years of Service!

***BUYERS** of stainless scrap, straight chromes, nichrome, pure nickel, nickel alloys & inconel*

IRON AGE

STEEL PRICES

Smaller numbers in price boxes indicate producing companies. For main office locations, see key on facing page.
Base prices at producing points apply only to sizes and grades produced in these areas. Prices are in cents per lb unless otherwise noted. Extras apply.

	Pittsburgh	Chicago	Gary	Cleveland	Canton Massillon	Middletown	Youngstown	Bethlehem	Buffalo	Conshohocken	Johnstown	Sparrows Point	Granite City	Detroit
INGOTS Carbon forging, net ton	$62.00[1]													
Alloy, net ton	$54.00[1,17]													$54.00[21]
BILLETS, BLOOMS, SLABS Carbon, rerolling, net ton	$56.00[1,5]	$56.00[1]	$56.00[1]						$56.00[3]		$56.00[3]			
Carbon forging billets, net ton	$66.00[1,5]	$66.00[1,4]	$66.00[1]	$66.00[4]	$66.00[4]				$66.00[3,4]	$73.00[3,6]	$66.00[3]			$69.00[21]
Alloy, net ton	$70.00[1,17,5]	$70.00[1,4]	$70.00[1,5]		$70.00[4]			$70.00[3]	$70.00[3,4]	$77.00[3,6]	$70.00[3]			$73.00[21]
PIPE SKELP	3.35[1] 3.45[3]						3.35[1,4]							
WIRE RODS	4.10[3] 4.30[18]	4.10[3,4,33]	4.10[3]	4.10[3]			4.10[3]		4.10[3,5]		4.10[3]	4.20[3]		
SHEETS Hot-rolled (18 ga. & hvr.)	3.60[1,5,9,15] 3.75[18]	3.60[3,33]	3.60[1,3,5]	3.65[4,5]		3.60[7]	3.60[1,4,5] 4.00[19]		3.60[3]	4.90[3,6]		3.60[3]	4.30[3,3]	3.80[13] 4.40[47]
Cold-rolled	4.35[1,5,9,15,7]		4.35[1,3,5]	4.35[4,5]		4.35[7]	4.35[4,5]		4.35[3]			4.35[3]	5.05[3,3]	4.85[13]
Galvanized (10 gage)	4.80[1,9,15]		4.60[1,5]		4.80[4]	4.80[7]	5.50[44] 6.00[44]					4.80[3]	5.50[3,3]	
Enameling (12 gage)	4.65[1]		4.65[1,5]	4.65[4]		4.65[7]	4.65[5]						5.25[3,3]	
Long terne (10 gage)	5.20[5,15]		5.20[1]			5.20[7]	6.00[44]							
Hi str. low alloy, h.r.	5.40[1,5] 5.75[9]	5.40[1]	5.40[1,3] 5.90[3]	5.40[4,5]			5.40[1,4,15] 5.90[3]		5.40[3]	5.65[3,6]		5.40[3]		5.95[13]
Hi str. low alloy, c.r.	6.55[1,5] 6.90[9]		6.55[1,3] 7.05[3]	6.55[4,5]			6.55[4] 7.05[3]		6.55[3]			6.55[3]		7.10[13]
Hi str. low alloy, galv.	7.20[1]											6.75[3]		
STRIP Hot-rolled	3.60[9], 4.00[41,58], 3.75[18] 3.50[5,7]	3.50[4,6]	3.50[1,4,5]			3.60[7]	3.50[1,4,5] 4.00[13]		3.80[3,4]	3.90[3,6]	3.50[3]	3.50[3]		4.40[47] 3.80[13]
Cold-rolled	4.65[5,7,9] 5.00[18] 5.35[40,53,58]	4.90[3,60]	4.90[3]	4.65[3,5]		4.65[7]	4.65[4,5] 5.25[49,49] 5.35[13,49]		4.65[3]			4.65[3]		4.85[13] 5.45[47] 5.90[53,61]
Hi str. low alloy, h.r.	5.75[9]		5.50[1] 5.30[3], 5.50[3]				4.95[4], 5.50[1] 5.40[13], 5.90[3]		4.95[3]	5.55[3,6]		4.95[3]		5.95[13]
Hi str. low alloy, c.r.	7.20[9]			6.55[3] 6.70[3]			6.20[4], 6.55[13] 7.05[3]		6.40[3]			6.40[3]		
TINPLATE† Coke, 1.25-lb base box (1.50 lb, add 25¢)	$8.45[1,5,9,15]		$8.45[1,3,5]				$8.45[4]					$8.55[3]		
Electrolytic 0.25, 0.50, 0.75 lb box	0.25 lb base box, $7.15[1,4,5,8,9]; $7.25[3,11]; $7.35[33] 0.50 lb, add 25¢; 0.75 lb add 50¢													
BLACKPLATE, 29 gage Hollowware enameling	5.85[1] 6.15[18]		5.85[1]				5.30[4]							
BARS Carbon steel	3.70[1,5] 3.85[9]	3.70[1,4,33]	3.70[1,4,5,8]	3.70[4]	3.70[4]		3.70[1,4,5]		3.70[3,4]		3.70[3]			3.85[21] 4.80[106]
Reinforcing	3.70[1,5]	3.70[4]	3.70[1,5,8]	3.70[4]			3.70[1,4,5]		3.70[3,4]		3.70[3]	3.70[3]		
Cold-finished	4.55[3,4,5,52,69,71]	4.55[3,33,70]	4.55[4,74,75]	4.55[3]	4.55[4,33]		4.55[3,57]		4.80[70]					4.70[84]
Alloy, hot-rolled	4.30[1,17]	4.30[1,4,33]	4.30[1,5,8]		4.30[4]		4.30[1,5]	4.30[3]	4.30[3,4]		4.30[3]			4.45[21] 4.65[13]
Alloy, cold-drawn	5.40[17,52,69,71,3]	5.40[4,33,69,70,73] 5.45[3]	5.40[4,73,74]		5.40[4,33]		5.40[3,35,57]	5.40[3]	5.40[3]					5.50[84] 5.80[106]
Hi str. low alloy, h.r.	5.55[1,5]		5.55[1,3] 6.05[3]	5.55[4,5]			5.55[1] 6.05[3]	5.55[3]	5.55[3]		5.55[3]			
PLATE Carbon steel	3.70[1,5,15] 4.00[9]	3.70[1,33]	3.70[1,5,8]	3.70[4,5]			3.70[1,4,5] 3.95[13]		3.70[3]	4.15[3,6]	3.70[3]	3.70[3]	4.40[3,3]	
Floor plates	4.75[1]	4.75[1]	4.75[3]	4.75[3]						4.75[3,6]				
Alloy	4.75[1]	4.75[1]	4.75[1]				5.20[13]			5.05[3,6]	4.75[3]	4.75[3]		
Hi str. low alloy	5.65[1,5]	5.65[1]	5.65[1,3] 6.15[3]	5.65[4,5]			5.65[4] 5.70[13] 6.15[3]			5.90[3,6]	5.65[3]	5.65[3]		
SHAPES, Structural	3.65[1,5] 3.90[9]	3.65[1,33]	3.65[1,5]					3.70[3]	3.70[3]		3.70[3]			
Hi str. low alloy	5.50[1,5]	5.50[1]	5.50[1,3] 6.00[3]				6.00[3]	5.50[3]	5.50[3]		5.50[3]			
MANUFACTURERS' WIRE Bright	4.85[2,5] 5.10[18]	4.85[3] 4.95,5.05		4.85[3]			4.85[3]	Kokomo—4.95[3,6] 4.85[3,6]			4.85[3]	4.95[3]	Duluth—4.85[3]	
PILING, Steel Sheet	4.45[1]	4.45[1]	4.45[3]						4.45[3]					

Smaller numbers indicate producing companies. See key at right. Prices are in cents per lb unless otherwise noted. Extras apply.

IRON AGE

STEEL PRICES

Kansas City	Houston	Birmingham	WEST COAST Seattle, San Francisco, Los Angeles, Fontana		
			F=$79.00[19]		INGOTS Carbon forging, net ton
	$82.00[83]		F=$80.00[19]		Alloy, net ton
		$66.00[11]	F=$75.00[19]		BILLETS, BLOOMS, SLABS Carbon, rerolling, net ton
	$74.00[83]	$66.00[11]	F=$85.00[19] SF, LS, S=$85.00[62]	Geneva=$66.00[16]	Carbon forging billets, net ton
	$78.00[83]		F=$89.00[19] LA=$90.00[62]		Alloy net ton
				(Alton=4.40[23] Worcester=4.40[2]	PIPE SKELP
	4.50[83]	4.10[4,11]	SF=4.90[2], F=4.90[19] LA=4.90[24,62]	Minnequa=4.35[14] Portsmouth=4.30[20]	WIRE RODS
		3.60[4,11]	SF, LA=4.30[24] F=4.55[19]	Niles=5.25[64], Geneva=3.70[16] Ashland=3.80[7]	SHEETS Hot-rolled (18 ga. & hvr.)
		4.35[11]	SF=5.30[24] F=5.30[19]		Cold-rolled
		4.80[4,11]	SF, LA=5.55[24]	Ashland=4.80[7] Kokomo=5.20[20]	Galvanized (10 gage)
				Ashland=4.65[7]	Enameling (12 gage)
					Long ternes (10 gage)
		5.40[11]	F=6.35[19]		HI str. low alloy, h.r.
			F=7.50[19]		HI str. low alloy, c.r.
					HI str. low alloy, galv.
4.10[83]	4.90[83]	3.50[4,11]	SF, LA=4.25[24,62] F=4.75[19], S=4.50[62]	(Alton=3.95[23] Atlanta=4.05[55] Minnequa=4.55[14] Ashland=3.50[7]	STRIP Hot-rolled
			F=6.30[19] LA=6.40[37]	New Haven=5.15[3], 5.85[58] Trenton=6.00[48]	Cold-rolled
		5.30[11]	(F=6.20[19] SF, LA=6.05[62] S=6.30[62]		HI str. low alloy, h.r.
			F=6.95[19]		HI str. low alloy, c.r.
		$8.55[12]	SF=9.20[24]		TINPLATE Coke, 1.25-lb base box (1.50 lb, add 25¢)
					Electrolytic 0.25, 0.50, 0.75 lb box
				(Alton=4.15[23]	BLACKPLATE, 29 gage Hollowware enameling
4.30[83]	4.10[83]	3.70[4,11]	SF, LA=4.40[24]	Atlanta=4.25[55] Minnequa=4.15[14]	BARS Carbon steel
4.30[83]	4.10[83]	3.70[4,11]	SF, S=4.45[62] F=4.40[19], LA=4.40[62]	Atlanta=4.25[55] Minnequa=4.50[14]	Reinforcing
			LA=6.00[4]	Newark=5.00[69] Putnam=5.10[69] Hartford=5.10[4]	Cold-finished
4.90[83]	4.70[83]		LA=5.35[62] F=5.35[19]		Alloy, hot-rolled
				(Newark=5.75[69] Worcester=5.75[2] Hartford=5.85[4]	Alloy, cold-drawn
		5.55[11]	F=6.60[19] SF, S=6.30[62] LA=6.25[62]	(Claymont=4.15[29] Coatesville=4.15[21]	HI str. low alloy, h.r.
	4.10[83]	3.70[4,11]	F=4.30[19] S=4.50[62]	Harrisburg=6.75[38] Minnequa=4.50[14] Geneva=3.70[16]	PLATE Carbon steel
				Harrisburg=6.75[38]	Floor plates
			F=5.70[19]	Coatesville=5.25[21] Claymont=4.85[29]	Alloy
		5.65[11]	F=6.25[19] S=6.55[62]	Geneva=5.65[16]	HI str. low alloy
4.25[83]	4.05[83]	3.60[4] 3.65[11]	SF=4.20[62] F=4.25[19] LA=4.25[24,62] S=4.30[62]	Geneva 3.65[16] Minnequa 4.10[14] Phoenixville=6.25[56]	SHAPES, Structural
		5.50[11]	SF=6.10[62,19] SF=6.00[62] LA=6.05[62]	Geneva=5.50[16]	SI str. low alloy
5.45[83]	5.25[83]	4.85[4,11]	SF, LA=5.80[24]	(Alton=5.05[23] Atlanta=5.10[55] Worcester=5.15[2] Minnequa=5.10[14] Portsmouth=5.25[20]	MANUFACTURERS' WIRE Bright

†Special coated mfg ternes deduct 95¢ from 1.25-lb coke base box price. Can-making quality blackplate, 55 to 128-lb, deduct $2.20 from 1.25-lb coke base box.

Key to Steel Producers

1 U. S. Steel Co., Pittsburgh
2 American Steel & Wire Co., Cleveland
3 Bethlehem Steel Co., Bethlehem
4 Republic Steel Corp., Cleveland
5 Jones & Laughlin Steel Corp., Pittsburgh
6 Youngstown Sheet & Tube Co., Youngstown
7 Armco Steel Corp., Middletown, Ohio
8 Inland Steel Co., Chicago
9 Weirton Steel Co., Weirton, W. Va.
10 National Tube Co., Pittsburgh
11 Tennessee Coal, Iron & R. R. Co., Birmingham
12 Great Lakes Steel Corp., Detroit
13 Sharon Steel Corp., Sharon, Pa.
14 Colorado Fuel & Iron Corp., Denver
15 Wheeling Steel Corp., Wheeling, W. Va.
16 Geneva Steel Co., Salt Lake City
17 Crucible Steel Co. of America, New York
18 Pittsburgh Steel Co., Pittsburgh
19 Kaiser Steel Corp., Oakland, Calif.
20 Portsmouth Div., Detroit Steel Corp., Detroit
21 Lukens Steel Co., Coatesville, Pa.
22 Granite City Steel Co., Granite City, Ill.
23 Wisconsin Steel Co., South Chicago, Ill.
24 Columbia Steel Co., San Francisco
25 Copperweld Steel Co., Glassport, Pa.
26 Alan Wood Steel Co., Conshohocken, Pa.
27 Calstrip Steel Corp., Los Angeles
28 Allegheny Ludlum Steel Corp., Pittsburgh
29 Claymont Steel Corp., Claymont, Del.
30 Continental Steel Corp., Kokomo, Ind.
31 Rotary Electric Steel Co., Detroit
32 Laclede Steel Co., Alton, Ill.
33 Northwestern Steel & Wire Co., Sterling, Ill.
34 Keystone Steel & Wire Co., Peoria, Ill.
35 Central Iron & Steel Co., Harrisburg, Pa.
36 Carpenter Steel Co., Reading, Pa.
37 Eastern Stainless Steel Corp., Baltimore
38 Washington Steel Corp., Washington, Pa.
39 Jessop Steel Co., Washington, Pa.
40 Blair Strip Steel Co., New Castle, Pa.
41 Superior Steel Corp., Carnegie, Pa.
42 Timken Steel & Tube Div., Canton, Ohio
43 Babcock & Wilcox Tube Co., Beaver Falls, Pa.
44 Reeves Steel & Mfg. Co., Dover, Ohio
45 John A. Roebling's Sons Co., Trenton, N. J.
46 Simonds Saw & Steel Co., Fitchburg, Mass.
47 McLouth Steel Corp., Detroit
48 Cold Metal Products Co., Youngstown
49 Thomas Steel Co., Warren, Ohio
50 Wilson Steel & Wire Co., Chicago
51 Sweet's Steel Co., Williamsport, Pa.
52 Superior Drawn Steel Co., Monaca, Pa.
53 Tremont Nail Co., Wareham, Mass.
54 Firth Sterling St. & Carbide, McKeesport
55 Ingersoll Steel Div., Chicago
56 Phoenix Iron & Steel Co., Phoenixville, Pa.
57 Fitzsimons Steel Co., Youngstown
58 Stanley Works, New Britain, Conn.
59 Universal-Cyclops Steel Corp., Bridgeville, Pa.
60 American Cladmetals Co., Carnegie, Pa.
61 Cuyahoga Steel & Wire Co., Cleveland
62 Bethlehem Pacific Coast Steel, San Fran.
63 Follansbee Steel Corp., Pittsburgh
64 Niles Rolling Mill Co., Niles, Ohio
65 Atlantic Steel Co., Atlanta
66 Acme Steel Co., Chicago
67 Joslyn Mfg. & Supply Co., Chicago
68 Detroit Steel Corp., Detroit
69 Wycoff Steel Co., Pittsburgh
70 Bliss & Laughlin, Inc., Harvey, Ill.
71 Columbia Steel & Shafting Co., Pittsburgh
72 Cumberland Steel Co., Cumberland, Md.
73 La Salle Steel Co., Chicago
74 Monarch Steel Co., Inc., Hammond, Ind.
75 Empire Steel Co., Mansfield, Ohio
76 Mahoning Valley Steel Co., Niles, Ohio
77 Oliver Iron & Steel Co., Pittsburgh
78 Pittsburgh Screw & Bolt Co., Pittsburgh
79 Standard Forging Corp., Chicago
80 Driver Harris Co., Harrison, N. J.
81 Detroit Tube & Steel Div., Detroit
82 Reliance Div., Eaton Mfg. Co., Massillon, Ohio
83 Sheffield Steel Corp., Kansas City
84 Plymouth Steel Co., Detroit
85 Wickwire Spencer Steel, Buffalo
86 Angell Nail and Chaplet, Cleveland
87 Mid-States Steel & Wire, Crawfordsville, Ind.
88 National Supply, Pittsburgh, Pa.
89 Wheatland Tube Co., Wheatland, Pa.
90 Mercer Tube & Mfg. Co., Sharon, Pa.
91 Woodward Iron Co., Woodward, Ala.
92 Sloss-Sheffield Steel & Iron Co., Birmingham
93 Hanna Furnace Corp., Detroit
94 Interlake Iron Corp., Cleveland
95 Lone Star Steel Co., Dallas
96 Mystic Iron Works, Everett, Mass.
97 Jackson Iron & Steel Co., Jackson, O.
98 Globe Iron Co., Jackson, O.
99 Pittsburgh Coke & Chemical Co., Pittsburgh
100 Shenango Furnace Co., Pittsburgh
101 Tennessee Products & Chem. Corp., Nashville
102 Koppers Co., Inc., Granite City, Ill.
103 Page Steel & Wire Div., American Chain & Cable, Monessen, Pa.
104 Wallingford Steel Co., Wallingford, Conn.
105 Tonawanda Iron Div., N. Tonawanda, N. Y.
106 Pilgrim Drawn Steel Div., Automotive Materials Corp., Plymouth, Mich.

STAINLESS STEELS

Base price, cents per lb, f.o.b. mill

Product	301	302	303	304	316	321	347	410	416	430
Ingots rerolling	14.25	15.25	16.75	16.25	24.75	20.00	21.75	12.75	14.75	13.00
Slabs billets rerolling	18.50	20.00	22.00	21.00	32.25	26.25	28.50	16.50	20.00	16.75
Forg. discs die blocks rings	34.00	34.25	36.75	35.75	53.00	40.25	44.75	28.00	28.50	28.50
Billets forging	26.25	26.50	28.50	27.75	41.50	31.25	35.00	21.50	22.00	22.00
Bars wires structurals	31.25	31.50	34.00	33.00	49.25	37.00	41.50	25.75	26.25	26.25
Plates	33.00	33.25	35.25	35.25	52.00	40.75	45.25	27.00	27.50	27.50
Sheets	41.00	41.25	43.25	43.25	57.00	49.25	53.75	36.50	37.00	39.00
Strip hot-rolled	26.50	26.25	32.50	30.25	48.75	37.00	41.25	23.50	30.25	24.00
Strip cold-rolled	34.00	36.75	40.25	38.75	59.00	48.25	52.25	30.50	37.00	31.00

STAINLESS STEEL PRODUCING POINTS—*Sheets:* Midland, Pa., 17; Brackenridge, Pa., 28; Butler, Pa., 7; McKeesport, Pa., 1; Washington, Pa., 38 (type 316 add 4, 5¢), 39; Baltimore, 37; Middletown, Ohio, 7; Massillon, Ohio, 4; Gary, 1; Bridgeville, Pa., 59; New Castle, Ind., 55; Ft. Wayne, Ind, 67; Lockport, N. Y., 45.

Strip: Midland, Pa., 17; Cleveland, 2; Carnegie, Pa., 41; McKeesport, Pa., 54; Reading, Pa., 36; Washington, Pa., 38 (type 316 add 4, 5¢); W. Leechburg, Pa., 28; Bridgeville, Pa., 59; Detroit, 47; Massillon, Canton, Ohio, 4; Middletown, Ohio, 7; Harrison, N. J., 80; Youngstown, 48; Lockport, N. Y., 46; New Britain, Conn., 58; Sharon, Pa., 13 (type 301 add ¼¢); Butler, Pa., 7; Wallingford, Conn., 104.

Bars: Baltimore, 7; Duquesne, Pa., 1; Munhall, Pa., 1; Reading, Pa., 36; Titusville, Pa., 59; Washington, Pa., 39; McKeesport, Pa., 1, 54; Bridgeville, Pa., 59; Dunkirk, N. Y., 28; Massillon, Ohio, 4; Chicago, 1; Syracuse, N. Y., 17; Watervliet, N. Y., 28; Waukegan, Ill., 2; Lockport, N. Y., 46; Canton, Ohio, 42; Ft. Wayne, Ind., 67.

Wire: Waukegan, Ill., 2; Massillon, Ohio, 4; McKeesport, Pa., 54; Bridgeport, Conn., 44; Ft. Wayne, Ind., 67; Trenton, N. J., 45; Harrison, N. J., 80; Baltimore, 7; Dunkirk, 28; Monessen, 103; Syracuse, N. Y., 17; Bridgeville, Pa., 59.

Structurals: Baltimore, 7; Massillon, Ohio, 4; Chicago, 1, 67; Watervliet, N. Y., 28; Bridgeport, Conn., 44; Syracuse, N. Y., 17.

Plates: Brackenridge, Pa., 28 (type 416 add ½¢); Butler, Pa., 7; Chicago, 1; Munhall, Pa., 1; Midland, Pa., 17; New Castle, Ind., 55; Lockport, N. Y., 46; Middletown, 7; Washington, Pa., 39; Cleveland, Massillon, 4.

Forged discs, die blocks, rings: Pittsburgh, 17; Syracuse, 17; Ferndale, Mich., 28; Washington, Pa., 39.

Forging billets: Midland, Pa., 17; Baltimore, 7; Washington, Pa., 39; McKeesport, 54; Massillon, Canton, Ohio, 4; Watervliet, 28; Pittsburgh, Chicago, 1; Syracuse, N. Y., 17.

*ALLEGHENY LUDLUM—Slightly higher on Type 301; slightly lower on others in 300 Series.

WASHINGTON STEEL—Slightly lower on 300 Series except where noted.

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Base Col.	Woven Wire Fence 9-15½ ga. Base Col.	Fence Posts Base Col.	Single Loop Bale Ties Base Col.	Twisted Barbless Wire Base Col.	Galv. Barbed Wire Base Col.	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. (1) ¢/lb.
Alabama City-4	118	126	....	123	....	136	5.70	5.95
Aliquippa, Pa.-5	118	132	....	....	136	140	5.70	6.15
Atlanta-65	121	133	....	126	126	143	5.95	6.40
Bartonville-34	118	130	....	123	143	143	5.70	6.15
Buffalo-85	....	....	....	....	....	....	4.85	....
Cleveland-86	125	....	....	....	....	....	....	....
Cleveland-2	....	....	....	....	....	....	5.70	6.15
Crawfordsville-87	....	132	....	....	....	145	5.95	6.40
Donora, Pa.-2	118	130	....	123	140	140	5.70	6.15
Duluth-2	118	130	....	123	140	140	5.70	6.15
Fairfield, Ala.-11	118	130	....	123	....	140	5.70	6.15
Houston-83	126	138	....	....	....	148	6.10	6.55
Johnstown, Pa.-3	118	130	....	....	140	....	5.70	6.15
Joliet, Ill.-2	118	130	....	123	....	140	5.70	6.15
Kokomo, Ind.-30	120	132	....	125	138	142	5.80	6.05
Los Angeles-62	....	....	....	....	....	....	6.65	....
Kansas City-83	130	....	....	135	....	152	6.30	6.75
Minnequa-14	123	138	130	128	146	146	5.95	6.45
Monessen-18	124	135	....	....	....	145	5.95	6.40
Moline, Ill.-4	....	....	136	....	....	....	....	....
Pittsburg, Cal.-24	137	....	....	147	156	160	6.65	6.80
Portsmouth-20	124	137	....	....	147	147	6.10	6.60
Rankin, Pa.-2	118	130	....	....	140	140	5.70	6.15
So. Chicago, Ill.-4	118	126	140	123	....	136	5.70	5.95
S. San Fran.-14	....	....	....	147	....	160	6.65	7.10
Sparrows Pt.-3	120	....	....	125	142	142	5.80	6.25
Sterling, Ill.-33	118	130	....	123	140	140	5.70	6.15
Struthers, Ohio-6	....	....	....	....	....	....	5.70	6.15
Torrance, Cal.-24	138	....	....	....	....	....	6.65	....
Worcester-2	124	....	....	....	....	....	6.00	6.45
Williamsport, Pa.-51	....	....	150	....	....	....	....	....

‡Cut Nails, carloads, base, $7.35 per 100 lb (less 20¢ to jobbers), at Conshohocken, Pa., (26), Wheeling, W. Va., (15), $7.15.

(1) Alabama City and So. Chicago do not include zinc extra.

CAST IRON WATER PIPE

Per Net Ton

6 to 24-in., del'd Chicago. $105.30 to $108.80
6 to 24-in., del'd N. Y. ... 108.50 to 109.50
6 to 24-in., Birmingham. 91.50 to 96.00
6-in and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less ..... $123.00 to $130.00

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Axles	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer-1	3.60	4.00	4.70	....	....	....	....	....
Chicago-4	....	....	....	6.15	....	....	....	....
Ensley-11	3.60	4.00	....	....	....	....	....	....
Fairfield-11	....	4.00	4.40	....	....	8.60	4.50	....
Gary-1	3.60	4.00	....	....	....	....	4.50	....
Ind. Harbor-6	3.60	....	4.70	6.15	5.60	8.60	4.50	....
Johnstown-3	....	4.00	....	....	5.60	8.60	....	....
Joliet-1	....	4.00	4.70	....	....	....	....	....
Kansas City-83	....	....	....	6.40	....	....	....	9.85
Lackawanna-3	3.60	4.00	4.70	....	....	8.60	4.50	....
Lebanon-3	....	....	....	6.15	....	....	....	9.85
Minnequa-14	3.60	4.50	4.70	6.15	....	8.60	4.50	9.85
Pittsburgh-77	....	....	....	....	....	9.35	....	9.85
Pittsburgh-78	....	....	....	....	....	....	....	9.85
Pittsburgh-5	....	....	....	6.15	....	....	....	....
Pittsburgh-24	....	....	....	....	....	....	4.65	....
Seattle-62	....	....	....	6.65	....	....	4.65	....
Steelton-3	3.60	....	4.70	....	....	....	4.50	....
Struthers-6	....	....	....	6.15	....	....	....	....
Torrance-24	....	....	....	....	....	....	4.65	....
Youngstown-4	....	....	....	6.15	....	....	....	....

BOILER TUBES

$ Per 100 ft., cut, 10 to 24 ft

F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
Babcock & Wilcox	2	13	22.67	26.66	21.99	25.86
	2½	12	30.48	35.84	29.57	34.76
	3	12	33.90	39.90	32.89	38.70
	3½	11	42.37	49.89	41.10	48.39
	4	10	52.60	61.88	51.03	60.02
National Tube	2	13	21.62	26.48	....	....
	2½	12	29.65	36.32	....	....
	3	12	34.00	41.64	....	....
	3½	11	40.34	49.41	....	....
	4	10	51.21	62.72	....	....
Pittsburgh Steel	2	13	....	27.08	....	....
	2½	12	30.49	37.15	....	....
	3	12	34.95	42.59	....	....
	3½	11	41.48	50.54	....	....
	4	10	52.65	64.16	....	....

FLUORSPAR

Washed gravel, f.o.b. Rosiclaire, Ill. Price, net ton; Effective CaF_2 content:
70% or more $43.00
60% or less 40.00

PIPE AND TUBING

Base discounts, f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD ½ in. Blk.	½ in. Gal.	¾ in. Blk.	¾ in. Gal.	1 in. Blk.	1 in. Gal.	1¼ in. Blk.	1¼ in. Gal.	1½ in. Blk.	1½ in. Gal.	2 in. Blk.	2 in. Gal.	2½-3 in. Blk.	2½-3 in. Gal.	SEAMLESS 2 in. Blk.	2 in. Gal.	2½-3 in. Blk.	2½-3 in. Gal.	3½-4 in. Blk.	3½-4 in. Gal.
STANDARD T. & C.																				
Sparrows Pt.-3	34.0	12.0	37.0	16.0	39.5	19.5	40.0	20.0	40.5	21.0	41.0	21.5	41.5	22.0	....	....	....	....	....	....
Cleveland-4	36.0	14.0	39.0	18.0	41.5	21.5	42.9	22.0	42.5	23.0	43.0	23.5	43.5	24.0	....	....	....	....	....	....
Oakland-19	25.0	3.0	28.0	7.0	30.5	10.5	31.0	11.0	31.5	12.0	32.0	12.5	32.5	13.0	....	....	....	....	....	....
Pittsburgh-5	36.0	14.0	39.0	17.0	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	29.5	8.0	32.5	11.5	34.5	13.5
Pittsburgh-10	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	9.5	32.5	12.5	34.5	14.5
Alton, Ill.-32	35.0	13.0	38.0	17.0	40.5	20.5	41.0	21.0	41.5	22.0	42.0	22.5	42.5	23.0	....	....	....	....	....	....
Sharon-90	36.0	13.0	39.0	17.0	41.5	20.0	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.0	....	....	....	....	....	....
Pittsburgh-88	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	....	32.5	....	34.5	....
Wheeling-15	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	....	....	....	....	....	....
Wheatland-89	36.0	14.0	39.0	17.0	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	....	....	....	....	....	....
Youngstown-6	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	9.5	32.5	12.5	34.5	14.5
EXTRA STRONG, PLAIN ENDS																				
Sparrows Pt.-3	33.5	13.0	37.5	17.0	39.5	20.5	40.0	21.0	40.5	22.0	41.0	22.5	41.5	23.0	....	....	....	....	....	....
Cleveland-4	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	....	....	....	....	....	....
Oakland-19	24.5	4.0	28.5	8.0	30.5	11.5	31.0	12.0	31.5	13.0	32.0	13.5	32.5	14.0	....	....	....	....	....	....
Pittsburgh-5	35.5	13.5	39.5	17.5	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	29.0	7.5	33.0	12.0	36.5	15.5
Pittsburgh-10	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	29.0	10.0	33.0	14.0	36.5	17.5
Alton, Ill.-32	32.5	12.0	36.5	16.0	38.5	19.5	39.0	20.0	39.5	21.0	40.0	21.5	40.5	22.0	....	....	....	....	....	....
Sharon-90	35.5	14.0	39.5	18.0	41.5	21.0	42.0	21.5	42.5	22.0	43.0	22.5	43.5	23.0	....	....	....	....	....	....
Pittsburgh-88	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	29.0	....	33.0	....	36.5	....
Wheeling-15	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	....	....	....	....	....	....
Wheatland-89	35.5	13.5	39.5	17.5	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	....	....	....	....	....	....
Youngstown-6	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	26.0	29.0	10.0	33.0	14.0	36.5	17.5

Galvanized discounts based on zinc at 17¢ per lb, East St. Louis. For each 1¢ change in zinc, discounts vary as follows: ½ in., ¾ in., and 1 in., 1 pt.; 1¼ in., 1½ in., 2 in., ¾ pt.; 2½ in., 3 in., ½ pt. Calculate discounts on even cents per lb of zinc, i.e., if zinc is 16.51¢ to 17.50¢ per lb, use 17¢. Jones & Laughlin discounts apply only when zinc price changes 1¢.

Threads only, buttweld and seamless, 1 pt. higher discount. Plain ends buttweld and seamless, 3 in. and under, 3½ pts. higher discount. Buttweld jobbers' discount, 5 pct.

Miscellaneous Prices

WAREHOUSES

Base price, f.o.b., dollars per 100 lb. *(Metropolitan area delivery add 20¢ except Birmingham, San Francisco, Cincinnati, New Orleans, St. Paul, add 15¢; Memphis, add 10¢; Philadelphia, add 25¢; New York, add 30¢).

Cities	Sheets			Strip		Plates	Shapes	Bars		Alloy Bars			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled A 4615 As rolled	Hot-Rolled A 4140 Annealed	Cold-Drawn A 4615 As rolled	Cold-Drawn A 4140 Annealed
Baltimore	5.60	6.84	7.49[2]–8.07	6.04	.....	5.80	6.14	6.04	6.84–6.89	10.24	10.54	11.89	12.19
Birmingham*	5.60	6.40	6.75	5.55	.....	5.95	5.70	5.55	.....	.....	.....	.....	.....
Boston	6.20	7.00–7.25	7.74–8.29	6.15	8.50[4]	6.46–6.78	6.20	6.05	6.79–6.84	10.25	10.55	11.90–12.00	12.20–12.30
Buffalo	5.60	6.40	7.74–8.09	5.86	.....	6.05	5.80	5.60	6.40–6.45	10.15–10.85	10.45	11.80	11.95–12.10
Chicago	5.60	6.40	7.75	5.55	.....	5.80	5.70	5.55	6.30	9.80	10.10	11.45	11.75
Cincinnati*	5.87	6.44	7.39	5.80	.....	6.19	6.09	5.80	6.61	10.15	10.45	11.80	12.10
Cleveland	5.60	6.40	8.10	5.69	6.90	5.92	5.82	5.57	6.40	9.91	10.21	11.56	11.86
Detroit	5.78	6.53	7.89	5.94	.....	5.99	6.09	5.84	6.56	10.11	10.41	11.76	12.06
Houston	7.00	8.25	.....	.....	.....	6.85	6.50	6.85	9.35	10.35	11.25	.....	12.75
Indianapolis, del'd	6.00	6.90	8.15	5.95	.....	6.20	6.10	5.95	6.80	.....	.....	.....	.....
Kansas City	6.00	6.80	7.45	6.15	7.50	6.40	6.30	6.15	7.00	10.40	10.70	12.05	12.35
Los Angeles	6.35	7.90	8.85	6.40	9.45[6]	6.40	6.35	6.35	8.20	11.30	11.30	13.20	13.50
Memphis*	6.33–6.38	7.08–7.18	.....	6.33–6.38	.....	6.43–8.02	6.33–6.48	6.08–6.33	7.16–7.32	.....	.....	.....	.....
Milwaukee	5.74	6.54	7.89	5.69–6.59	.....	5.94	5.84	5.69	6.44–6.54	9.94	10.24	11.59	11.89
New Orleans*	5.70	6.59	.....	5.75	7.25	5.95	5.75	5.75	7.30	.....	.....	.....	.....
New York*	5.67–5.97	7.19[5]–7.24[1]	8.14[2]	6.29–6.89	8.63[4]	6.26–6.58	6.10	6.12	6.99	10.05–10.15	10.35–10.45	11.70–11.80	12.10–12.20
Norfolk	6.50[3]	.....	.....	.....	.....	6.50[3]	6.60[3]	6.55[3]	.....	.....	.....	.....	.....
Philadelphia*	5.90	6.80	8.00	6.10	.....	6.05	5.90	6.05	6.86	9.90	10.20	.....	.....
Pittsburgh	5.60	6.40	7.75	5.65–5.95	.....	5.75	5.70	5.55	6.15	9.80	10.10	11.45	11.75
Portland	6.60–7.55	8.95	8.50–9.10	7.30	.....	6.80	6.95	6.90	.....	.....	12.15	.....	.....
Salt Lake City	7.95	.....	9.70–10.50[2]	8.70–8.75	.....	8.05	6.75–8.30	7.95–8.65	9.00	.....	.....	.....	.....
San Francisco*	6.65	8.05[2]	8.55–8.90[2]	6.60	9.95[6]	6.59	6.45	6.45	8.20	11.30	11.30	13.20	13.20–13.50
Seattle	7.05	8.60	9.20	9.05	.....	6.75	6.65	6.75	9.05	.....	.....	.....	.....
St. Louis	5.80–5.85	6.65	8.00	5.80	8.00[4]–8.28	6.13	6.03	5.80	6.55–6.65	10.05	10.35	11.70	12.00
St. Paul*	6.16	6.96	8.31	6.11	.....	6.36	6.26	6.11	6.96	10.36	10.66	12.01	12.31

BASE QUANTITIES (Standard unless otherwise keyed): Cold finished bars; 2000 lb or over. Alloy bars; 1000 to 1999 lb. All others; 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets, for quantity.
EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 400 to 1999 lb; (4) 6000 lb and over; (5) 1500 to 9999 lb; (6) 2000 to 5999 lb.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Foundry	Malleable	Bessemer	Low Phos.	Blast Furnace Silvery	Low Phos. Charcoal
Bethlehem-3	54.00	54.50	55.00	55.50	.....	.....	.....
Birmingham-4	48.38	48.88	.....	.....	.....	.....	.....
Birmingham-91	48.38	48.88	.....	.....	.....	.....	.....
Birmingham-92	48.38	48.88	.....	.....	.....	.....	.....
Buffalo-4	52.00	52.50	53.00	.....	.....	.....	.....
Buffalo-93	52.00	52.50	53.00	.....	.....	63.75	.....
Chicago-94	52.00	52.50	52.50	53.00	.....	.....	.....
Cleveland-2	52.00	52.50	52.50	53.00	57.00	.....	.....
Cleveland-4	52.00	52.50	52.50	.....	.....	.....	.....
Daingerfield, Tex.-98	48.00	48.50	48.50	.....	.....	.....	.....
Duluth-94	52.00	52.50	52.50	53.00	.....	.....	.....
Erie-94	52.00	52.50	52.50	53.00	.....	.....	.....
Everett, Mass.-96	.....	57.00	57.50	.....	.....	.....	.....
Fontana-19	58.00	58.50	.....	.....	.....	.....	.....
Geneva, Utah-18	52.00	52.50	52.50	53.00	.....	.....	.....
Granite City, Ill.-102	53.90	54.40	54.90	.....	.....	.....	.....
Hubbard, Ohio-6	52.00	52.50	52.50	.....	.....	.....	.....
Ironton, Utah-18	52.00	52.50	.....	.....	.....	.....	.....
Jackson, Ohio-97, 98	.....	.....	.....	.....	.....	62.50	.....
Lyle, Tenn.-101	.....	.....	.....	.....	.....	.....	66.00
Manassas-18	54.00	.....	.....	.....	.....	.....	.....
Neville Island-99	52.00	52.50	52.50	53.00	.....	.....	.....
Pittsburgh-1	52.00	.....	.....	53.00	.....	.....	.....
Sharpsville-100	52.00	52.50	52.50	53.00	.....	.....	.....
Steelton-3	54.00	54.50	55.00	55.50	60.00	.....	.....
Swedeland-26	56.00	56.50	57.00	57.50	.....	.....	.....
Toledo-94	52.00	52.50	52.50	53.00	.....	.....	.....
Troy, N. Y.-4	54.00	54.50	55.00	.....	60.00	.....	.....
Youngstown-6	52.00	52.50	52.50	53.00	.....	.....	.....
N. Tonawanda, N. Y.-105	.....	52.50	53.00	.....	.....	.....	.....

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct, except low phos. 1.75 to 2.00 pct), 50¢ per ton for each 0.50 pct manganese over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Subtract 38¢ per ton for phosphorus, content 0.70 pct and over. Silvery Iron: Add $1.50 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. $1 per ton for 0.75 pct or more phosphorus, manganese as above. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

REFRACTORIES

Fire Clay Brick

(F.o.b. works)
Carloads, Per 1000

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5) $94.60
No. 1 Ohio 88.00
Sec. quality, Pa., Md., Ky., Mo., Ill. 88.00
No. 2 Ohio 79.20
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50) 13.75

Silica Brick

Mt. Union, Pa., Ensley, Ala. $94.60
Childs, Pa. 99.00
Hays, Pa. 100.10
Chicago District 104.50
Western Utah and Calif. 111.10
Super Duty, Hays, Pa., Athens, Tex., Chicago 111.10
Silica cement, net ton, bulk, Eastern (except Hays, Pa.) 16.50
Silica cement, net ton, bulk, Hays, Pa. 18.70
Silica cement, net ton, bulk, Ensley, Ala. 17.60
Silica cement, net ton, bulk, Chicago District 17.60
Silica cement, net ton, bulk, Utah and Calif. 24.70

Chrome Brick

Per Net Ton

Standard chemically bonded, Balt., Chester $82.00

Magnesite Brick

Standard, Baltimore $104.00
Chemically bonded, Baltimore 93.00

Grain Magnesite

St. 3/8-in. grains

Domestic, f.o.b. Baltimore, in bulk fines removed $62.70
Domestic, f.o.b. Chewelah, Wash., in bulk 36.30
in sacks 41.80

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk Midwest, add 10¢; Missouri Valley, add 20¢ $13.00

COKE

Net Ton

Furnace, beehive (f.o.b. oven) Connellsville, Pa. ..... $14.50 to $15.00
Foundry, beehive (f.o.b. oven) Connellsville, Pa. ..... $17.50 to $18.00
Foundry, oven coke
Buffalo, del'd $26.69
Chicago, f.o.b. 23.00
Detroit, f.o.b. 24.00
New England, del'd 24.80
Seaboard, N. J., f.o.b. 22.75
Philadelphia, f.o.b. 22.70
Swedeland, Pa., f.o.b. 22.60
Painesville, Ohio, f.o.b. 24.00
Erie, Pa., f.o.b. 23.50
Cleveland, del'd 25.72
Cincinnati, del'd 25.06
St. Paul, f.o.b. 22.50
St. Louis 25.40
Birmingham, del'd 21.69
Neville Island 23.00

LAKE SUPERIOR ORES

(51.50% *Fe; natural content, delivered lower lake ports*) *Per gross ton*

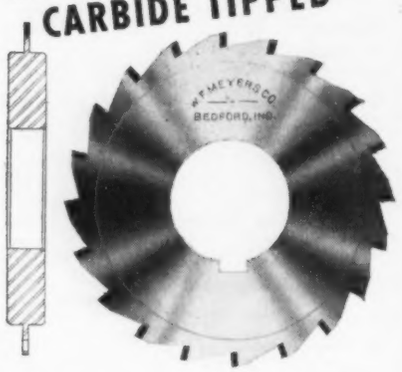
Old range, bessemer $8.70
Old range, nonbessemer 8.55
Mesabi, bessemer 8.45
Mesabi, nonbessemer 8.30
High phosphorus 8.30

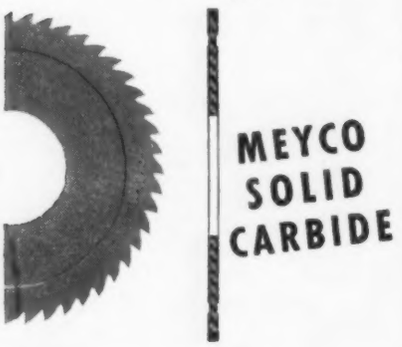
After adjustments for analyses, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

C-R SPRING STEEL

F.o.b. Mill Cents Per Lb.	CARBON CONTENT				
	0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Bridgeport, Conn.-58	5.35	6.80	7.40	9.35	11.65
Carnegie, Pa.-41	.....	6.80	7.40	9.35	11.65
Cleveland-2	4.65	6.45	7.40	9.35	11.65
Detroit-68	5.60	6.65	7.25	.....	.....
New Castle, Pa.-40	5.35	6.80	7.40	9.35	.....
New Haven, Conn.-68	5.85	6.75	7.35	.....	.....
Sharon, Pa.-13	5.35	6.80	7.40	9.35	11.65
Weirton, W. Va.-9	5.35	6.80	7.40	9.35	11.65
Worcester, Mass.-2	4.95	6.75	7.70	9.65	11.65
Youngstown-48	.....	6.80	7.40	9.35	11.65

MEYCO CARBIDE TIPPED





MEYCO SOLID CARBIDE

MEYCO saws and cutters in various diameters and thicknesses can be furnished to your individual specifications. MEYCO cutters have earned an enviable reputation where long tool life and precision are a must.

Increase production in your slotting, venting and slitting operations by using MEYCO cutters. Please furnish complete specifications and quantities desired when requesting prices and indicate material to be cut.

Manufacturers of precision tools since 1888

W. F. MEYERS CO., INC.
BEDFORD, INDIANA

Miscellaneous Prices

BOLTS, NUTS, RIVETS, SCREWS

Consumer Prices
(Base discount, f.o.b. mill, Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

	Pct Off List Less Case	C.
½ in. & smaller x 6 in. & shorter	15	28½
9/16 in. & ⅝ in. x 6 in. & shorter	18½	30½
¾ in. & larger x 6 in. & shorter	17½	29½
All diam. longer than 6 in.	14	27½
Lag, all diam. x 6 in. & shorter	23	35
Lag, all diam. longer than 6 in.	21	33
Plow bolts	34	....

Nuts, Hot Pressed, Cold Punched—Sq

	Pct Off List Less Keg (Reg.)	K.	Less Keg (Hvy.)	K.
½ in. & smaller.	15	28½	15	28½
9/16. in. & ⅝ in..	12	25	6½	21
¾ in. to 1½ in. inclusive	9	23	1	16½
1⅝ in. & larger.	7½	22	1	16½

Nuts, Hot Pressed—Hexagon

½ in. & smaller.	26	37	22	34
9/16 in. & ⅝ in..	16½	29½	6½	21
¾ in. to 1½ in. inclusive	12	25	2	17½
1⅝ in. & larger.	8½	23	2	17½

Nuts, Cold Punched—Hexagon

½ in. & smaller.	26	37	22	34
9/16 in. & ⅝ in..	23	35	17½	30½
¾ in. to 1½ in. inclusive	19½	31½	12	25
1⅝ in. & larger.	12	25	6½	21

Nuts, Semi-Finished—Hexagon

	Reg.		Hvy.	
½ in. & smaller.	35	45	28½	39½
9/16 in. & ⅝ in..	29½	40½	22	34
¾ in. to 1½ in. inclusive	24	36	15	28½
1⅝ in. & larger.	13	26	8½	23
	Light			
7/16 in. & smaller	35	45		
½ in. thru ⅝ in.	28½	39½		
¾ in. to 1½ in. inclusive	26	37		

Stove Bolts — *Pct Off List*

Packaged, steel, plain finished	48—10
Packaged, plated finish	31—10
Bulk, plain finish**	62*

*Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

**Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

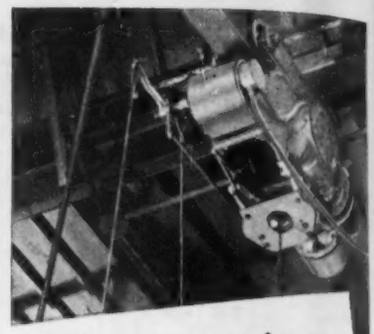
Rivets — *Base per 100 lb.*

½ in. & larger.....	$7.85
	Pct Off List
7/16 in. & smaller.....	36

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham, Lebanon, Pa.

Cap and Set Screws
(In bulk) — *Pct Off List*

Hexagon head cap screws, coarse or fine thread, ¼ in. thru ⅝ in. x 6 in., SAE 1020, bright.....	54
⅝ in. thru 1 in. up to & including 6 in.	48
¼ in. thru ⅝ in. x 6 in. & shorter high C double heat treat.....	46
⅝ in. thru 1 in. up to & including 6 in.	41
Milled studs	35
Flat head cap screws, listed sizes....	16
Fillister head cap, listed sizes.....	34
Set screws, sq head, cup point, 1 in. diam and smaller x 6 in. & shorter	53



Modern Hoist Logic:
3-2 = LOWER COSTS!

—Yes, rock-bottom handling costs—*and* more output per hour! Here's the record: Heavy drums of chemicals had to be lifted to a raised vat—and lifted fast. The block and tackle formerly used required 3 men to get the proper lift speed. This ½-ton Reading Electric Hoist paid for itself in 2 months by keeping 2 men on their regular jobs and letting the third raise drums alone—in half the previous time! Let a Reading engineer help you get the same kind of handling results with a fast, smooth-working Reading Electric Hoist. Drop us a line today for full details. No obligation, of course.

READING CRANE & HOIST CORP.
2101 ADAMS STREET • READING, PA.

READING CRANES

—Miscellaneous Prices—

M. Ferrochrome

Contract price, cents per pound, chromium contained, lump size, delivered.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.	
Carloads	21.60
Ton lots	23.75
Less ton lots	25.25
Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.	
Carloads	27.75
Ton lots	30.05
Less ton lots	31.35

ELECTRODES

Cents per lb., f.o.b. plant threaded electrodes with nipples, unboxed

Diam. in in.	Length in in.	Cents Per lb.
	GRAPHITE	
17, 18, 20	60, 72	17.85
8 to 16	48, 60, 72	17.85
7	48, 60	19.57
6	48, 60	20.95
4, 5	40	21.50
3	40	22.61
2½	24, 30	23.15
2	24, 30	25.36
	CARBON	
40	100, 110	8.02
35	65, 110	8.03
30	65, 84, 110	8.03
24	72 to 104	8.03
20	84, 90	8.03
17	60, 72	8.03
14	60, 72	8.57
10, 12	60	8.84
8	60	9.10

CLAD STEEL

Base prices, cents per pound, f.o.b. mill

Stainless-carbon	Plate	Sheet
No. 304, 20 pct.		
Coatesville, Pa. (21)	*29.5	
Washgtn, Pa. (39)	*29.5	
Claymont, Del. (29)	*28.00	
Conshohocken, Pa. (26)		*27.50
New Castle, Ind. (55)	*26.50	*25.50
Nickel-carbon		
10 pct Coatesville (21)	32.5	
Inconel-carbon		
10 pct Coatesville (21)	40.5	
Monel-carbon		
10 pct Coatesville (21)	33.5	
No. 302 Stainless-copper stainless, Carnegie, Pa. (60)		77.00
Aluminized steel sheets, hot dip, Butler, Pa. (7)		7.75

*Includes annealing and pickling, or sandblasting.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	$1.505
18	4	1	—	5	$2.13
18	4	2	—	—	$1.65
1.5	4	1.5	8	—	$81.0
6	4	2	6	—	96.5¢

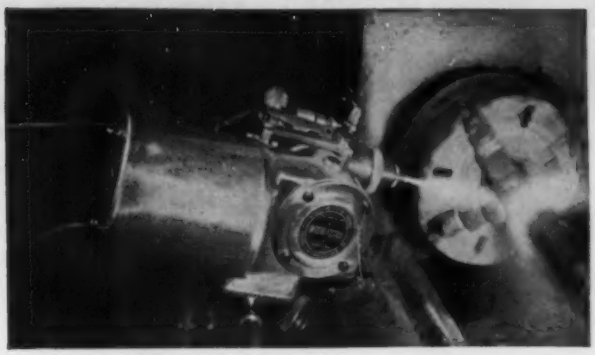
High-carbon chromium	63.5¢
Oil hardened manganese	35¢
Special carbon	32.5¢
Extra carbon	27¢
Regular carbon	23¢

Warehouse prices on and east of Mississippi are 3.5¢ per lb higher. West of Mississippi, 5.5¢ higher.

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.l.f. New York, ocean bags	7.4¢ to 9.0¢
Canadian sponge iron, del'd, In East	10.00¢
Domestic sponge iron, 98+% Fe, carload lots	15.5¢ to 17.0¢
Electrolytic iron, annealed, 99.5+% Fe	42.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe	53.5¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe.	63.0¢ to 80.0¢



Rebuild Worn Parts by *Metallizing*

Save time, money and critical parts by Metallizing with new Mogulectric Gun. Adds metal to metal with fine atomization for perfect bond. Simplified, easy to use, engineered to give trouble-free service.

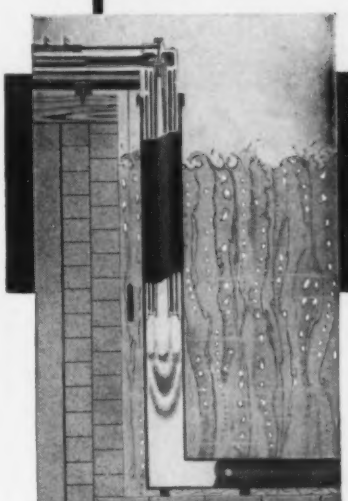
Also ideal for spraying corrosion-resistant metal coatings and for production work.

If you already have metallizing equipment, why not consider a trade-in now for the new Mogulectric Gun.

Write for new booklet containing complete information on equipment as well as production and maintenance applications.

METALLIZING COMPANY OF AMERICA
3520 W. Carroll Avenue • Chicago 24, Ill.

Submerged Combustion
DIRECT FIRED GAS BURNERS
FOR FASTER, CLEANER LOWER COST
PICKLING



Exposed view of Submerged Combustion Burner installed directly into pickling vat. Automatically gas fired. Thermostatically controlled to keep acid at correct pickling temperature.

★ Flame burns below surface of acid—heats and agitates acid for faster, cleaner pickling.

★ Does not dilute acids—Highly corrosion resistant—Low operating and maintenance cost.

★ Install in present tanks, or add new vats without adding to boiler load. Burns any type gas —natural or manufactured.

Free *Send for descriptive booklet #41 and details*

SUBCOMCO
SUBMERGED COMBUSTION CO.
OF AMERICA, INC.
759 LOGAN STREET HAMMOND, IND.

On any metal finishing problem

DEPEND on DU-LITE TO SAVE TIME

Courtesy C. J. Bates & Son

Calcium buffing compound was formerly removed from the fluted surfaces of these tweezers by costly hand brushing and follow up cleaning rinse. After the switch to Du-Lite's safety soak solvent, Dynakleen, the compound was removed in seconds and the tweezers quick-dried to a sparkling finish, with no other operations necessary.

What's YOUR problem?

Du-Lite's service to industry is complete from research on specific metal finishing problems to installation of processing equipment. Du-Lite's line includes cleaners, strippers, blacking agents, wetting agents, passivating agents, rust preventatives, burnishing compounds etc. for any type of metal.

See your nearest Du-Lite Field Engineer or write for more information.

DU-LITE CHEMICAL CORP.
MIDDLETOWN, CONN.

Rush information on your products for finishing following metals:

Aluminum..... Steel..... Stainless Steel.....
Brass..... Copper..... Zinc.....
Others.....
Name.....
Company.....
Address.....
City..... Zone..... State.....

Du-Lite
METAL FINISHING SPECIALISTS

—Miscellaneous Prices—

Metal Powders *(continued)*

Carbonyl iron, size 5 to 10 micron, 98%, 99.8+% Fe	83.0¢ to $1.48
Aluminum	$1.5¢
Brass, 10 ton lots	30.00¢ to 33.25¢
Copper, electrolytic	10.75¢ plus metal value
Copper, reduced	10.00¢ plus metal value
Cadmium, 100-199 lb	95¢ plus metal value
Chromium, electrolytic, 99% min., and quantity, del'd.	$3.50
Lead	7.5¢ to 12.0¢ plus metal value
Manganese	57.0¢
Molybdenum, 99%	$2.75
Nickel, unannealed	88.0¢
Nickel, annealed	95.0¢
Nickel, spherical, unannealed	92.0¢
Silicon	38.5¢
Solder powder	7.0¢ to 9.0¢ plus met value
Stainless steel, 302	83.00¢
Stainless steel, 316	$1.10
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh)	$6.00
Zinc, 10 ton lots	23.0¢ to 30.5¢

ELECTRICAL SHEETS

22 Ga. H-R cut lengths

F.o.b. Mill Cents Per Lb.	Armature	Elec.	Motor	Dynamo	Transf. 72	Transf. 65	Transf. 58
Beech-Bottom-15	.....	7.25	8.50	9.30	9.85	10.40	11.10
Brackenridge-28	.....	7.25	8.50	9.30	9.85	.....	.....
Follansbee-63	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Granite City-22	.....	7.95	9.20	.....	.....	.....	.....
Ind. Harbor-3	6.75	7.25	.....	.....	.....	.....	.....
Mansfield-75	7.25	7.75	9.00	9.80	.....	.....	.....
Niles, O.-64	7.05	7.55	.....	.....	.....	.....	.....
Vandergrift-1	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Warren, O.-4	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Zanesville-7	6.75	7.25	8.50	9.30	9.85	10.40	11.10

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads, delivered. (65-72% Cr, 2% max. Si.)

0.06% C	30.50	0.20% C	29.50
0.10% C	30.00	0.50% C	29.25
0.15% C	29.75	1.00% C	29.00
2.00% C			28.75
65-69% Cr, 4-9% C			32.00
62-66% Cr, 4-6% C, 6-9% Si.			32.60

Foundry Ferrochrome

Contract prices, cents per lb of alloy
Noncontract prices add 2.50¢ per lb.
High carbon 8 Mesh and down.
62 to 66% Cr, 5 to 7% C, 7 to 10% Si.

Carloads, bulk	23.25
Carloads, packed	24.15
Ton lots, packed	27.25

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots. 97% min. Cr, 1% max. Fe.

0.10% max. C.	$1.14
0.50% max. C.	1.10
9 to 11% C.	1.08

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-49%, C 0.05% max.) Contract price, carloads, f.o.b. Niagara Falls, freight allowed; lump 4-in. x down, bulk 2-in. x down, 21.75¢ per lb of contained Cr plus 12.40¢ per lb of contained Si.

Bulk 1-in. x down, 21.90¢ per lb contained Cr plus 12.60¢ per lb contained Si.

Buying or Selling
STEEL PLANT EQUIPMENT
CALL Curry!

Buying? If you are in the market for steel plant equipment—*Call Curry!* Whether you need a 3-Hi Breakdown Mill, a 44" Roll Grinder, a 1,000 H.P. Motor, or other equipment, we may have the answer to your requirements among our complete list of available steel plant machinery and equipment.

Selling? If you have surplus equipment to sell—Call Curry! Phone, wire or write us today! We are constantly in contact with important buyers in domestic and foreign industrial plants—and may have a customer waiting for just the equipment you have for sale. Get in touch with us.

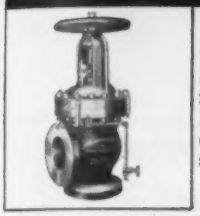
Write for the CURRY LIST!

You should have the current copy of the Curry List of available steel plant equipment. Write for your copy today!

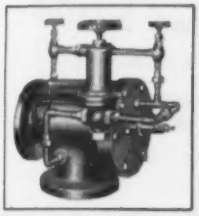
See our ad on page 431

ALBERT Curry & CO. INC.
STEEL PLANT EQUIPMENT
941 OLIVER BUILDING - PITTSBURGH 22, PENNA.
Phone ATlantic 1-1370

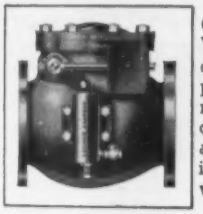
For minimum maintenance and greater all-around dependability USE GOLDEN-ANDERSON *Cushioned* STEAM AND WATER AUTOMATIC VALVES



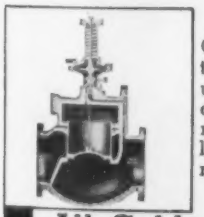
G-A Triple-Acting Non-Return Valve for safety needed on high pressure boilers. Bulletin S-1A sent on request.



G-A Surge Relief Valve protects water lines against excessive pressures caused by surges in the system. Bulletin W-2 describes this valve in detail.



G-A Swing Check Valve for air, water or liquids allows full pipe line flow with minimum pressure drop. Provided with adjustable air cushioning. Bulletin W-1 will interest you.



G-A Altitude Control Valve maintains uniform water level control in tanks, reservoirs, etc. Bulletin W-4 sent on request.

All Golden-Anderson Valves are designed with the patented special double cushioning feature to prevent hammer or shock. *May we cooperate with you on your pressure control problem?*

GOLDEN ANDERSON
Valve Specialty Company
2096 KEENAN BLDG. · PITTSBURGH 22, PA.

—Miscellaneous Prices—

Calcium-Silicon

Contract price per lb of alloy, dump, delivered.
30-33% Ca, 60-65% Si, 3.00% max. Fe.

Carloads	19.00
Ton lots	22.10
Less ton lots	23.60

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered.
16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	20.00
Ton lots	22.30
Less ton lots	23.30

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots	16.50¢
Less ton lots	17.75¢

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.00¢
Ton lots to carload packed	19.00¢
Less ton lots	20.50¢

5MZ

Contract price, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ⅛ in. x 12 mesh.

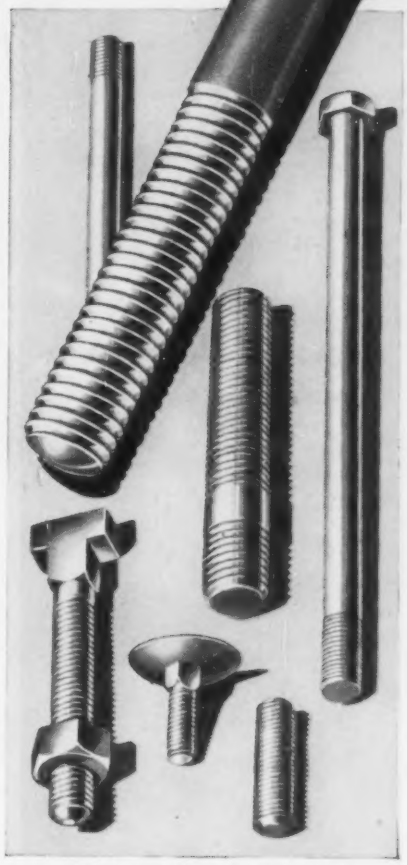
Ton lots	17.50
Less ton lots	19.50

—Ferroalloy Prices—

Alsifer, 20%, Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	9.90¢
Ton lots	11.30¢
Calcium molybdate, 45-40%, f.o.b. Langeloth, Pa., per pound contained Mo.	$1.15
Ferrocolumbium, 50-60%, 2 in. x D, contract basis, delivered, per pound contained Cb.	
Ton lots	$4.90
Less ton lots	4.95
Ferro-Tantalum-columbium, 20% Ta, 40% Cb, 0.30 C. Contract basis, delivered, ton lots, 2 in. x D, per lb of contained Cb plus Ta	$3.75
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo.	$1.32
Ferrophosphorus, electrolytic, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton	$65.00
10 tons to less carload	75.00
Ferrotitanium, 40%, regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa. freight allowed, ton lots, per lb contained Ti	$1.35
Ferrotitanium, 25%, low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti	$1.50
Less ton lots	1.55
Ferrotitanium, 15 to 18%, high carbon, f.o.b. Niagara Falls, N. Y. freight allowed, carload per net ton	$177.00
Ferrotungsten, standard, lump or ¼ x down, packed, per pound contained W, 5 ton lots, delivered	$5.00

Looking for specialties?
EYE BOLTS

Accurately made in sizes ¼" and larger, or to your specifications, Pawtucket Eye Bolts are the answer to many assembly problems. Exclusive production methods keep costs low — assure uniform Class 3 Fit.



BETTER BOLTS SINCE 1882

Use Headed and Threaded Fasteners for Economy and Reliability

PAWTUCKET
"THE BOLT MAN"
MANUFACTURING COMPANY
327 Pine Street · Pawtucket, R. I.
THE PLACE TO SOLVE YOUR BOLT PROBLEMS
T.M. REG.

—Miscellaneous Prices—

Ferroalloy Prices *(continued)*

Ferrovanadium, 35-55%, contract basis, delivered, per pound, contained V.	
Openhearth	$3.00-$3.10
Crucible	3.10- 3.20
High speed steel (Primos)	3.20- 3.25
Molybdic oxide, briquets or cans, per lb contained Mo, f.o.b Langeloth, Pa.	$1.14
bags, f.o.b. Washington, Pa., Langeloth, Pa.	$1.13
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Carload, bulk lump	14.50¢
Ton lots, bulk lump	15.75¢
Less ton lots, lump	16.25¢
Vanadium pentoxide, 86-89% V_2O_5 contract basis, per pound contained V_2O_5	$1.38
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Ton lots	21.00¢
Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy.	
Carload, bulk	7.00¢

Boron Agents

Contract prices per lb of alloy, del.

Borosil, f.o.b. Philo, Ohio, freight allowed, B, 3-4%, Si, 40-45%, per lb contained B	$5.25
Bortam, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢
Carbortam, Ti, 15-21%, B, 1-2%, Si, 2-4%, Al, 1-2%, C, 4.5-7.5%, f.o.b. Suspension Bridge, N. Y., freight allowed.	
Ton lots, per pound	10.00¢
Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D. Ton lots	$1.20
F.o.b. Wash., Pa.; 100 lb up	
10 to 14% B	.85
14 to 19% B	1.20
19% min. B	1.50
Grainal, f.o.b Bridgeville, Pa., freight allowed, 100 lb and over.	
No. 1	$1.00
No. 6	68¢
No. 79	50¢
Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd	
Ton lots	$1.46
Less ton lots	1.57
Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.	
Less ton lots	$1.80
Silcaz, contract basis, delivered.	
Ton lots	45.00¢

Ferromanganese

78-82% Mn. maximum contract base price, gross ton, lump size.

F.o.b. Niagara Falls, Alloy, W. Va., Ashtabula, O.	$185
F.o.b. Johnstown, Pa.	$187
F.o.b. Sheridan, Pa.	$185
F.o.b. Etna, Clairton, Pa.	$188

$2.00 for each 1% above 82% Mn, penalty, $2.15 for each 1% below 78%.

Briquets—Cents per pound of briquet, delivered, 66% contained Mn.

Carload, bulk	10.95
Ton lots	12.55

Spiegeleisen

Contract prices gross ton, lump, f.o.b.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Palmerton, Pa.	$74.00	$75.00
Pgh. or Chicago	75.00	76.00

—Miscellaneous Prices—

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.
96% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	34.75
Ton lots	36.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	28
Ton lots	30
Less ton lots	32

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb. of contained Mn ..... 19.15¢

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C. For 2% max. C, deduct 0.2¢.

Carload bulk	9.90
Ton lots	11.55
Briquet, contract basis carlots, bulk delivered, per lb of briquet	11.15
Ton lots	12.75

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $92.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $90.00. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 for each 0.50% Mn over 1%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.

96% Si, 2% Fe	21.70
97% Si, 1% Fe	22.10

Silicon Briquets

Contract price, cents per pound of briquet bulk, delivered, 40% Si, 2 lb Si briquets.

Carload, bulk	6.95
Ton lots	8.55

Electric Ferrosilicon

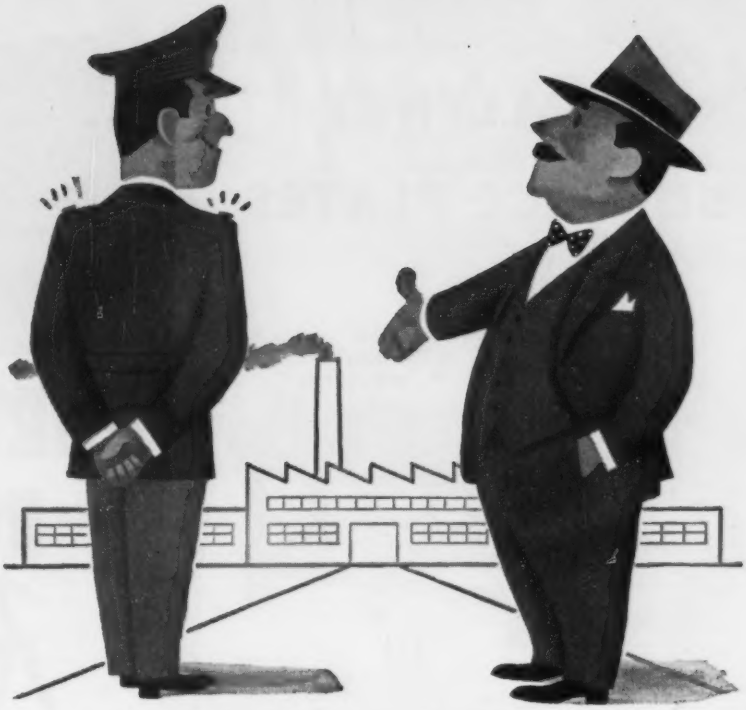
Contract price, cents per pound contained Si, lump, bulk, carloads, delivered.

15% Si	20.00	75% Si	14.30
50% Si	12.40	85% Si	15.55
90-95% Si			17.50

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd, Mn 85-90%.

	Carloads	Ton	Less
0.7% max. C, 0.06% P, 90% Mn	26.25	28.10	29.30
0.07% max. C	25.75	27.60	28.80
0.15% max. C	25.25	27.10	28.30
0.30% max. C	24.75	26.60	27.80
0.50% max. C	24.25	26.10	27.30
0.75% max. C, 7.00% max. Si	21.25	23.10	24.30



on a business tour... his investment's secure

With today's extended delays in replacements, dollars mean less and less protection, when fire strikes. No chance of extensive cutbacks in vital production, loss of day-to-day revenue or decrease in customer good will, when your investment in materials, equipment and buildings is fully protected from the ravages of fire with efficient, quick-acting C-O-TWO Fire Protection Equipment.

No matter what your property . . . factory, mill, warehouse, power station or research center . . . or a particular fire hazard such as spray booth, dip tank, pump room, electrical equipment enclosure or record vault . . . there is a type of C-O-TWO Fire Protection Equipment that gives you fast, positive action the instant fire strikes. Whether it's a C-O-TWO Squeez-Grip Carbon Dioxide Type Fire Extinguisher for an incipient fire, or a C-O-TWO Built-In High Pressure or Low Pressure Carbon Dioxide Type Fire Extinguishing System for total flooding an entire fire hazardous area . . . C-O-TWO means experienced engineering that assures you of the best type equipment for the particular fire hazard concerned.

For example, at many locations a C-O-TWO Combination Smoke Detecting and Fire Extinguishing System is a "must." The first trace of smoke in a protected area sounds an alarm . . . then fast, clean, non-damaging, non-conducting carbon dioxide blankets the fire, putting it out in seconds, before it spreads and causes extensive damage . . . no after fire mess, no water damage with carbon dioxide.

So, whatever your fire protection problem, let an expert C-O-TWO Fire Protection Engineer help you in planning complete and up-to-date fire protection facilities now. Write us today . . . tell us about your particular fire hazards . . . no obligation.

TRADE MARK C-O-TWO REG. U.S. PAT. OFF.

C-O-TWO FIRE EQUIPMENT COMPANY

NEWARK 1 • NEW JERSEY

Sales and Service in the Principal Cities of United States and Canada

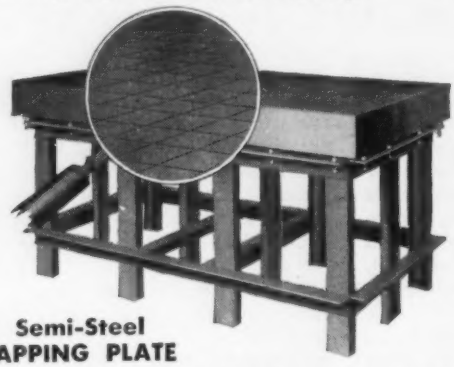
Affiliated with Pyrene Manufacturing Company

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

CHALLENGE
Precision
SURFACE PLATES
FOR
- LAYOUT
- INSPECTION
- CHECKING
- LAPPING
- ASSEMBLY
- WELDING

Available either precision ground or planer finished, Challenge Layout Surface Plates offer a perfectly smooth, square surface for layout, inspection or assembly line operations. Sizes range from 12" x 18" to 54" x 144". All are built of special analysis semi-steel. The all-steel stand is arc-welded to furnish the rigidity of a one-piece unit. Special leveling screws enable the user to level the plate quickly and to lock it securely.



Semi-Steel LAPPING PLATE

For Accurate Lapping of Delicate Joints. Assures perfect fit when lapping metal-to-metal joints on which no sealer is used. Ideally suited for use on parts which must be lapped perfectly to avoid oil leaks. Plates have 1/16" grooves 1/2" apart.

CHALLENGE semi-steel WELDING TABLE

The Challenge Welding Table illustrated above provides a true, rigid surface with Tee-Slots to facilitate assembling, locating and welding. It is built of fine grain special analysis semi-steel in three standard sizes: 30 x 60", 48 x 96", and 54 x 144"; other sizes to order. 682

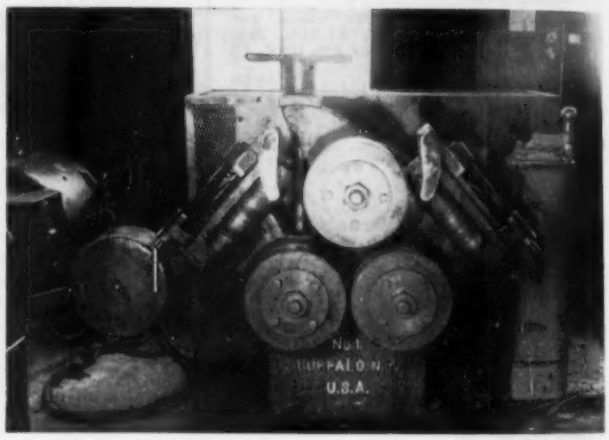
THE CHALLENGE MACHINERY COMPANY

Office, Factories and Show Room . . . Grand Haven Michigan

Challenge

TRADE-MARK ®

THE PORTLAND COMPANY ROLLS OUT THE *Rush Jobs*



—and rolls 'em out *accurately* with this

"Buffalo"

BENDING ROLL

The Portland Company, Boilermakers, Machinists and Founders, Portland, Me., is known for its accurate, prompt work. One reason is this "Buffalo" No. 1 Vertical Bending Roll. "All in a day's work" recently Portland completed an order for 94 rings of 36½" outside diameter, rolled leg-in from 2" x 2" x ¼" angle. A partial group of the rings is shown at top. If you bend angles, tees, flats, pipe, channels and other structurals, your cheapest method is by "Buffalo" Bending Rolls. Complete information is in Bulletins 352-B and 3344-A, yours on request.

"Buffalo" MACHINE TOOLS

BUFFALO FORGE COMPANY

492 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Branch Offices in all Principal Cities

BENDING CUTTING
SHEARING DRILLING PUNCHING

Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

ehigh H Shear Blades o Blame for Idle Time

e other day a Bethlehem salesman was prised to find one of his good cus-mers, a shop boss, in a somewhat hostile ood for no apparent reason. "You've t me in real trouble," the boss said. Remember that Lehigh H steel you sug-ested we use for shear blades?"

"Why, yes, I do," admitted the salesman.

"Well, come with me," replied the cus-mer. "I want to show you something."

They walked out in the shop where the ear blades were used to cut steel and ass strip. So far as the Bethlehem man uld see, the blades seemed to be work-g fine. He looked at the customer and is time he detected a twinkle in his eye.

Leisure for Tool Grinder

"See that fellow over there?" And the stomer pointed to a workman who was eading the morning paper. "That's our ool grinder, and he's a good one, too. He sed to spend most of his time grinding lades. But those blades we made out of ehigh H just seem to last forever. And very morning I have to rack my brains find something else for him to do!"

The boss had a good laugh. Then he ave the salesman an order for more ehigh H tool steel. He could afford to ave his tool grinder idle much of the time. is shearing costs had been sliced in half.

High-carbon, high-chromium Lehigh H just what the experienced toolmaker eeds wherever maximum wear and inimum distortion are important. It's ir-hardening, safe for intricate dies, in sections, sharp corners. And it's eep-hardening, with high compressive rength for heavy-duty tools and dies.

Ten Times More Necktie Clasps with Hobbed Molds of Duramold A

Here's another enthusiastic report on Duramold A, our 5 per cent chromium, air-hardening hobbing steel. Hobbed for zinc die castings, this special-purpose steel has upped the life of molds by at least 1000 pct, according to Peerless Engineering Co., Inc., South Gate, Calif. In the casting of novelty necktie clasps, the die sets of Duramold A were examined at a time when previous molds had to be discarded. The Duramold A cavities showed no evidence of checking or sinking; and the surface finish appeared to have actually improved with use.

M. T. Derby, chief tool engineer for Peerless, sums it up:

"We like Duramold A because it's easy to hob. In making multiple cavities we get good detail and accuracy with fewer machine-hours. For most of our work we need a steel that gives us a high polish in the cavities with a high hardness that will stand up under zinc-injection molding at high pressures and temperatures. We've found Duramold A to have good core strength, it doesn't sink readily, and we can expect to get long runs with very little maintenance."

Whether used for die-casting or plastic-molding Duramold A is a real improvement over hard-to-hob steels. Its 5 pct chromium content provides plenty of wear-resistance and core strength . . .

Duramold A is hobbed in one push in a 300-ton press by the master hob shown at top. Eight necktie clasps are cast at one time, the molten zinc being injected at 800 F and 2000 psi; mold temperatures reach about 500 F.

and its air-hardening properties hold distortion to a minimum during heat-treatment.

Its typical analysis:

C	Mn	Si	Cr	Mo
0.07 max	0.40	0.20	4.50	0.45

Booklet 271 will help you select the right tool steel — for hobbed molds, machine-cut molds, or master hobs. Address your request to our Publications Department, Room 1041, Bethlehem, Pa.

Our Tool Steel Engineer Says:

Poor tool design can cause cracking in heat-treatment

Proper attention paid to tool design can often prevent the cracking of tools during heat-treatment. Too often the heat-treater is asked to harden tools which cannot be quenched properly. One frequent design fault is a tool having a heavy section adjacent to a light section. Unnecessarily sharp corners is another design fault that can cause cracking. Provide fillets wherever sharp corners are not essential.

Bethlehem ULTRASONIC TESTED **Tool Steel**